

A Patient's Guide to Nutrition in Inflammatory Bowel Disease

Prof. Darija Vranešić Bender, PhD

Prof. Željko Krznarić, MD, PhD, FEBGH

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AUTHORS

Prof. Darija Vranešić Bender, PhD,
UHC Zagreb, Department of Internal
Medicine, Unit of Clinical Nutrition
Prof. Željko Krznarić, MD, PhD, FEBGH
UHC Zagreb, Department of Internal
Medicine, Division of Gastroenterology
and Hepatology and Unit of Clinical
Nutrition

REVIEWER

Prof. Donatella Verbanac, PhD
Faculty of Pharmacy and Biochemistry,
University of Zagreb

TRANSLATION

Eva Mandić
Verbarij

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Table of contents

Introduction	4
Diet and lifestyle as risk factors for IBD development	6
Importance of adequate nutritional status	7
4th edition	7
Importance of healthy and balanced diet	12
Basic dietary requirements of IBD patients	15
Dietary guidelines during various stages of inflammatory bowel disease	21
Diet therapy for inflammatory bowel disease	29
Role of microbiota and the use of probiotics	37
Pharmaconutrients	40
Concluding remarks	43
References	44
Recipes	45

Introduction

Ulcerative colitis and Crohn's disease belong to a group of chronic inflammatory bowel diseases (IBD) which are characterised by inflammatory changes in the mucosa and/or bowel wall. The aetiology of inflammatory diseases is not fully understood, but it is essentially an inflammation resulting from an inadequate response of the intestinal immune system to the antigens of the gut microbiota. Both diseases **are characterised by periods of active disease** (clinical relapse) and **unremarkable clinical presentation** (remission). Unfortunately, nearly 50% of patients present with frequent or periodic worsening of clinical presentation. Inflammatory bowel diseases (IBDs) are systemic autoimmune diseases accompanied by numerous organ system complications (extraintestinal). In children, IBD is often characterised by growth retardation. Particularly frequent occurrences in patients with chronic inflammatory bowel diseases, especially those with Crohn's disease, include significant weight loss and protein-energy malnutrition, which are due to various factors such as loss of appetite, food avoidance due to abdominal pain and diarrhoea which can be triggered by food intake, malabsorption and maldigestion, drug interactions and other, primarily postoperative complications. In addition to that, the frequency of obesity and excess body mass in these patients has increased in recent years. Over the past few decades, **the therapeutic approach to IBD treatment** has increasingly started to shift back to the basic hypotheses of the relationship between different kinds of diet or types of food and the digestive system. It also aims to shed light **on the role of nutrition as a risk factor for the development of inflammatory bowel diseases, as well as a support therapy**, but also as a possible **primary therapy**.

An important characteristic of inflammatory bowel disease is a distinct variety of clinical features, as well as biochemical, endoscopic and histological findings of different patients. Therefore, defining adequate nutrition for inflammatory bowel disease is a complicated task for patients, as well as doctors and nutritionists. Characteristic gastrointestinal symptoms, which include diarrhoea, abdominal pain,

nausea and unintentional weight loss, constantly remind patients that their disease is directly connected to nutrition. Therefore, many patients expect strict, exact and detailed rules when it comes to adequate nutrition for inflammatory bowel diseases. However, there are no general guidelines that could apply to all patients. The dietary recommendations vary depending on different forms and stages of the disease. Also, not all patients respond equally to diet therapy. Each patient requires an individual approach, and the outcome is optimal when the patient is involved in the creation and performance monitoring of the prescribed diet. The basis of adequate nutrition is the patient's personal experience and a moderate diet plan, which is based on food that is rich in energy, protein and micronutrients, especially in the active disease periods.

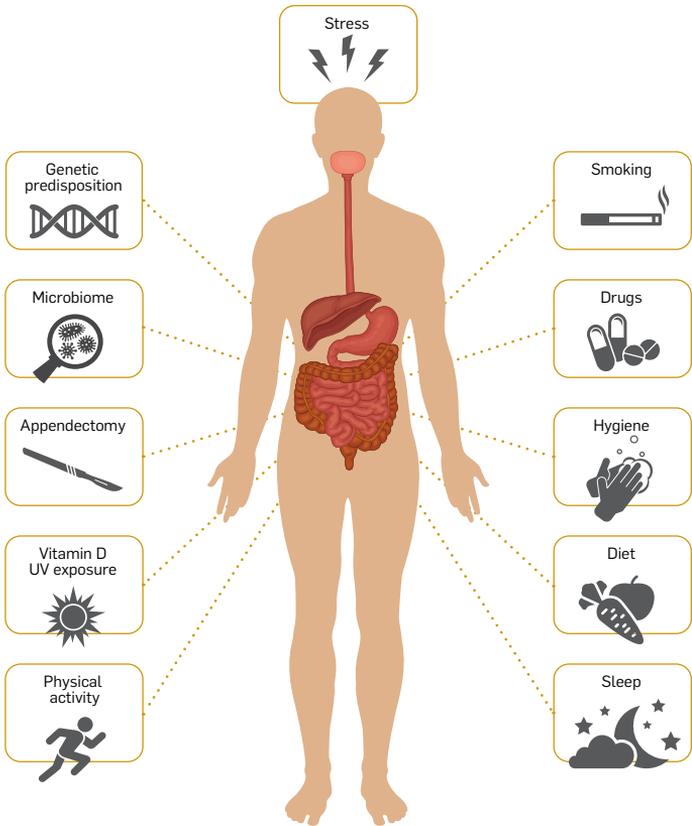


Figure 1 Risk factors for inflammatory bowel disease (adapted according to: Ananthakrishnan AN. *Nat Rev Gastroenterol Hepatol* 2015;12(4): 205–217.)

Diet and lifestyle as risk factors for IBD development

Lifestyle and nutrition with a high content of “fast”, ultra-processed food, large amounts of sugar and sweets, low-fibre diet and excessive intake of omega-6 fatty acids, is associated with an increased incidence of inflammatory bowel diseases. A lower risk of inflammatory bowel diseases has been observed in individuals who consume more fruit and vegetables, while a higher risk of IBD development was observed in individuals who consume less fruit and vegetables and more foods that are high in animal fats and sugar. Studies have shown that in Crohn’s disease patients, diagnosis was frequently preceded by weight gain and obesity, but this was not confirmed in the case of ulcerative colitis. Undesirable changes in the composition of microbiota are also inherent to these diseases and modern approaches to diet therapy for inflammatory bowel disease are based on microbiota modulation through diet and food nutrients.

Physical inactivity, stress and lack of sleep are scientifically proven risk factors for the development of inflammatory bowel diseases. For many years, smoking and appendectomy have been described as risk factors that increase the likelihood of Crohn’s disease but also prevent the development of ulcerative colitis. However, this link seems to be much more complex and is likely to be genetically-mediated. In addition to the aforementioned dietary factors, vitamin D, zinc and selenium also have a vital role in the development of inflammatory bowel diseases. Excessive hygiene and sanitation practices characteristic of the urban lifestyle and the frequent use of antibiotics have an adverse effect on the composition and number of species of microbes that make up the gut microbiota. Due to all of the aforementioned data which are shown in Figure 1, it can be concluded that diet, lifestyle and behaviour, as well as changes in gut microbiota composition play an important role in the pathogenesis of inflammatory bowel diseases.

Importance of adequate nutritional status

A parameter that gives us a fundamental insight into an individual's nutritional status is called the body mass index (BMI). BMI is calculated by dividing weight (W) in kilograms with height in meters (H) squared. Interpretation of results is shown in Table 1.

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 (\text{m}^2)$$

Table 1
Body Mass Index (BMI), waist circumference and risk of chronic disease

Nutritional status	BMI	Obesity class	Risk of chronic disease (type II diabetes, hypertension, cardiovascular disease) based on weight and waist circumference	
			Men < 102 cm	Men > 102 cm
			Women < 88 cm	Women > 88 cm
Underweight	< 18.5		–	–
Normal*	18.5 – 24.9		–	–
Overweight	25.0 – 29.9		slightly high	slightly high
Obese	30.0 – 34.9	I	high	very high
	35.0 – 39.9	II	very high	very high
Morbidly obese	> 40	III	extremely high	extremely high

* increased waist circumference is also an indicator of increased disease risk, even in individuals with normal body mass index

The BMI limit value for hospitalised patients is 20 kg/m² and the patients with a BMI lower than 20 kg/m² are considered to be at nutritional risk. In addition to BMI calculation, the measurement of body composition (measurement of fat and muscle mass) and the determination of selected laboratory parameters are performed for a thorough insight into the patient's nutritional status. The measurement of body composition is performed using special bioimpedance scales and it can also be performed by measuring skin folds. The term malnutrition usually refers

to undernutrition, and in the case of significant loss of muscle mass we use the term sarcopenia. The risk of malnutrition and sarcopenia can be assessed using a number of different survey methods, some of which are suitable for hospitalised patients (inpatients) while others are more appropriate for patients in homecare. A special R-MAPP protocol, shown in Figure 2, which is primarily intended for family physicians, has been developed to assess the risks of malnutrition and sarcopenia. However, patients can also use these questionnaires to assess their risk of malnutrition and sarcopenia and they can later discuss the results with their doctor, who will assess whether there is a need to prescribe specific nutritional support therapy.

Malnutrition is a common occurrence in patients with Crohn's disease and is due to a number of factors such as loss of appetite, food avoidance due to complications triggered by food intake, malabsorption and maldigestion, drug interactions, and other complications. Patients with ulcerative colitis are also prone to malnutrition and various nutritional deficiencies, but to a lesser extent and severity than patients with Crohn's disease. The incidence of IBD-related malnutrition is high, it may occur in 23% of outpatients and up to 85% of inpatients who were hospitalised for disease exacerbation, and it is more frequent in the active disease period.

Emergency hospital admissions are more often in malnourished IBD patients, and these patients are also more likely to be hospitalised due to infections. In addition to that, in hospitalised patients, malnutrition is an independent risk factor for the development of venous thromboembolism, non-elective surgery, prolonged length of hospital stay (PLOS) and increased mortality. The severity of malnutrition in IBD is determined by disease activity, its duration and progression, and in particular, the intensity of the inflammatory response that promotes catabolism (increased breakdown of food molecules in the body) and total daily food intake. Patients with Crohn's disease are at risk of malnutrition even in remission periods, while patients with ulcerative colitis mainly develop complications in the active disease period.

Figure 2
"R-MAPP" remote
risk assessment
protocol for
malnutrition and
sarcopenia

5
STEPS

R-MAPP: REMOTE CONSULTATION ON MALNUTRITION IN THE PRIMARY PRACTICE

R-MAPP: REMOTE CONSULTATION ON MALNUTRITION IN THE PRIMARY PRACTICE

A SIMPLE GUIDE TO ASSESSING PATIENTS BY VIDEO OR VOICE CALL

This graphic is intended for use in a primary care setting in order to identify patients at risk of malnutrition and ensure optimal nutritional care.

SET UP

Prepare yourself for remote consultation

Check medical documentation for malnutrition risk factors and polymorbidity:

COVID - 19 Ageing / frailty Cancer COPD IBD Stroke Post-ICU
Chronic kidney and liver disease Chronic wounds Diabetes Obesity Other chronic diseases

CONNECT

Contact patient by phone or video call

Check audio and video

Can you hear/see me?

Confirm the patient's identity

Name
Surname
Date of birth

Check patient's location

Where are you right now?
Home
Care Home
Hospital

EXAMINATION

Malnutrition screening

Use 'MUST' and 'SARC-F' to identify risk of malnutrition and muscle mass loss

'Malnutrition Universal Screening Tool' or 'MUST' is a five-step screening tool to identify adults, who are malnourished, at risk of malnutrition, or obese.

'SARC-F' is a rapid diagnostic test for sarcopenia based on 5 components.

IDENTIFY MALNUTRITION RISK

Check if your patient is at risk of malnutrition by asking the following 3 questions:

'MUST' Malnutrition screening tool

What is your current body weight?	0	> 20 (vs 30 Cbwt)
What is your height?	1	18.5-20
Calculate patients BMI kg/m ² *	2	< 18.5
What is your usual weight?	0	Weight loss < 5%
Have you experienced unintentional weight loss in the last 3 - 6 months?	1	Weight loss 5-10 %
	2	Weight loss > 10 %
Are you acutely ill or has your food intake been reduced / likely to be reduced for > 5 days?	0	No
	2	Yes

*Body Mass Index (or BMI) is calculated as weight (in kg) divided by the square of height (in m)

Add 'MUST' scores together to calculate overall risk of malnutrition:

Score 0 Low Risk
Score 1 Medium Risk
Score 2 or more High Risk

IDENTIFY LOSS OF MUSCLE MASS AND FUNCTION

If the 'MUST' score is ≥ 1 or your patient has one or more malnutrition risk factors (see in 'Set up' box) check for sarcopenia.

'SARC-F' Sarcopenia screening Test

STRENGTH How much difficulty do you have in lifting and carrying 4.5 kg? *4.5 kg is approximately the weight of a pet cat or purkin.	0	None
	1	Some
	2	A lot or unable
ASSISTANCE WITH WALKING How much difficulty do you have walking across a room?	0	None
	1	Some
	2	A lot, use aids, or unable
RISE FROM A CHAIR How much difficulty do you have transferring from a chair or bed?	0	None
	1	Some
	2	A lot or unable without help
CLIMB STAIRS How much difficulty do you have climbing a flight of 10 stairs?	0	None
	1	Some
	2	A lot or unable
FALLS How many times have you fallen in the past year?	0	None
	1	1-3 falls
	2	4 or more falls

'SARC-F' score equal to or greater than 4 is predictive of sarcopenia

DECISION AND ACTION

Advise, intervene and arrange follow-up according to nutritional screening results

'MUST' Score ≤ 1 and/or
'SARC-F' Score ≤ 4

OBSERVE AND REPEAT SCREENING

in Care Homes monthly and in community annually for at-risk groups e.g. those > 75 yrs

'MUST' Score ≥ 2 and/or
'SARC-F' Score ≥ 4

TREAT

Recommend oral nutritional supplements (ONS) or continue nutrition support; physical activity should also be encouraged as possible

If the patient is already on ONS check compliance
2 bottles is usual recommended daily dose

If you need help refer to clinical dietitian, hospital physician or implement local policy.

INTERVENTION

Tailor nutritional therapy to your patient's needs

ENERGY
25 - 35 kcal/kg
body weight/day*

PROTEIN
> 1.0 g/kg
body weight/day**

MICRONUTRIENTS
daily requirements***

THERAPEUTIC NUTRITION

- Consider HMB / leucine, vitamin D for patients with muscle mass and/or function loss
- Omega-3 EPA for cancer patients
- Arginine, Glutamine, Zinc, HMB, vitamin C for chronic wounds
- TGF- β 2 for IBD patients

SPECIAL CONSIDERATIONS: Kidney disease: formulas with modified protein and electrolytes / Diabetes: formulas with slow release & low glycaemic index carbohydrates / Dysphagia: modified texture diets and thickened drinks / Malabsorption: peptide-based formulas with medium chain triglycerides

HMB = β -hydroxy- β -methylbutyrate | EPA = eicosapentaenoic acid

* In obese and sarcopenic obese patients should be calculated with ideal body weight

** The level of protein to be used (g) in patients with severe kidney disease (eGFR ≤ 30 mL/min^{1.73m2}), use 0.8 g of protein/kg BW/day

*** Should be adjusted individually in case of deficiencies

Over the last decade, obesity has become an increasingly common occurrence in patients with inflammatory bowel disease. In Western society, approximately 20 to 40% of IBD patients are classified as obese, and patients with obesity are at higher risk of developing disease complications and infections, they are more frequently hospitalised and they are at higher risk of surgery. In addition to that, obesity is associated with faster elimination of biological agents from the body, resulting in low concentrations of pharmaceuticals and a poor response to biological therapy. In addition to that, the gut microbiota is imbalanced in individuals with obesity, i.e., there is an occurrence of dysbiosis, that is, a condition in which pathogenic microorganisms are predominant, which may cause a metabolic or immune response in patients. Dysbiosis may be associated with intestinal mucosal barrier dysfunction, and the disrupted gastrointestinal barrier can result in immune system activation and bacterial translocation. Inflammation in the intestinal tract is accompanied by the activation of immune cells and increased production of cytokines and their infiltration into adjacent adipose tissue. Therefore, fatty tissue located between certain visceral organs is metabolically more active and poses a far greater health risk than subcutaneous adipose tissue accumulation. Therefore, it is clear that obesity treatment should be considered as an adjuvant therapy in patients with inflammatory bowel disease, however, weight-loss diet should only be followed when the disease is in remission.

In addition to the increase in fatty tissue, in this patient population, there is often a loss of muscle mass or sarcopenia. Besides the loss of muscle mass, sarcopenia is defined by loss of muscle strength and poor physical function. It commonly occurs in the elderly population and its prevalence in hospitalised patients is almost 70%. Although it is often associated with slimmer individuals, it has become an increasingly common occurrence in patients with obesity, as well as in patients with IBD. Sarcopenic patients with IBD require surgical interventions more often, and sarcopenia is also associated with a postoperative course characterised by various complications.

Nutritional support therapy is an important component of IBD patient treatment which includes malnutrition prevention and treatment. A targeted and pragmatic improvement in nutritional status can ultimately improve the outcome of IBD patients. Therefore, screening and malnutrition treatment programme should be initiated and conducted under the supervision of a trained multidisciplinary team. The importance of perioperative nutritional intervention that reduces risks and potential complications should be noted. Patient care should ideally include the measurement of body composition, i.e., muscle mass and body fat content measurement, and dietitian advice, along with adequate physical activity which suits the needs of each individual patient and/or physical therapy.



Importance of healthy and balanced diet

Table 2

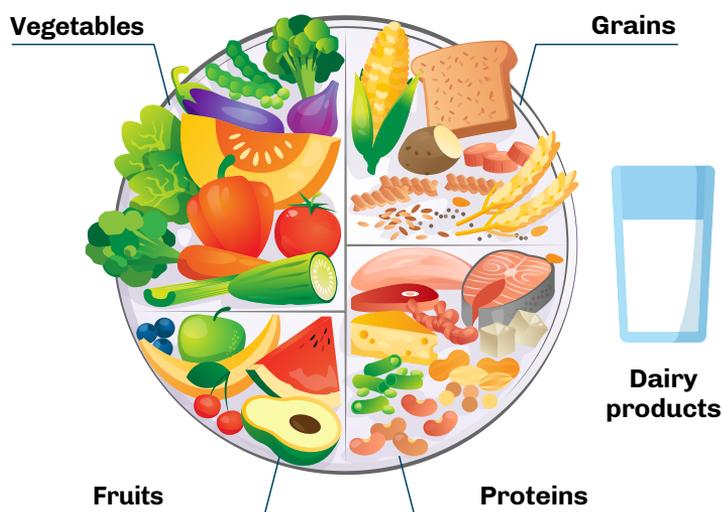
The recommended daily serving size for certain food groups

While creating a diet plan, we usually divide the food in six groups, depending on the daily energy requirements. Each food group has a recommended serving size that should be included during the day.

The food groups and the recommended serving sizes are shown in Table 2.

Food group	Serving size
Grains and grain products (bread, baked goods, pasta...)	6 – 11
Fruits	2 – 3
Vegetables	2 – 3
Dairy products	2 – 3
Lean meats, poultry, legumes, nuts, eggs	2
Fats	2 – 3

Figure 3
The "MyPlate" nutrition guide, also known as "ChooseMyPlate"



Serving size

In the creation of a healthy diet plan, the term “serving size” has a whole other meaning than the term “serving size” that we use every day. For example, the usual serving of spaghetti that you get in a restaurant usually consists of 2 – 3 servings.

According to the USDA Department of Health and Human Services, one serving (depending on different food groups) contains::

Meat, poultry, fish, legumes, eggs, nuts

- 60 – 85 g of cooked lean meat, poultry or fish
- 1 egg
- 1/2 cup of cooked beans
- 1/3 cup of nuts

Milk, yoghurt, cheese

- 1 cup of milk or yoghurt
- 30 – 60 g cheese

Bread, rice, pasta, cereal

- 1 slice of bread
- 1/2 cup of cooked rice or pasta
- 1/2 cup of cooked cereal
- approx. 30 g of cereal

Vegetables

- 1/2 cup of chopped raw or cooked vegetables
- 1 cup of raw leafy vegetables

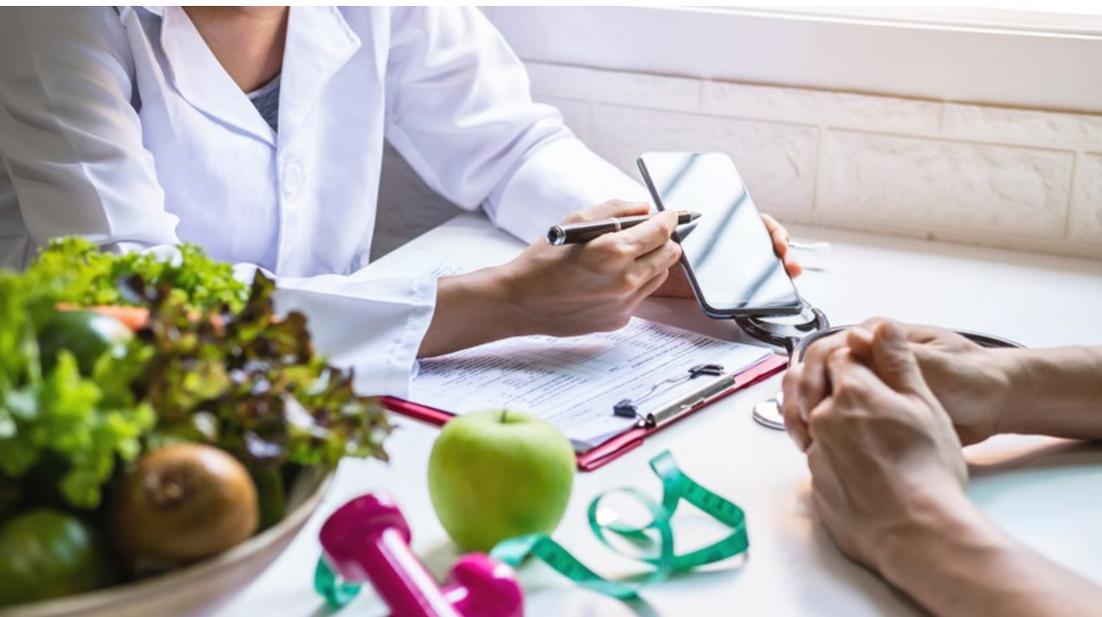
Fruits

- 1 whole fruit
- 3/4 cup of fruit juice
- 1/2 cup of canned fruit
- 1/4 cup of dried fruit

The 2010 Dietary Guidelines issued by the U.S. Department of Agriculture (USDA) include the following recommendations, shown in the “MyPlate” nutrition guide (Figure 3):

- Fill half of your plate with fruits and vegetables.
- At least half of your total grain intake should be whole grains.
- Replace whole milk and full-fat milk products with skim-milk products.
- Control your sodium intake by consuming fewer foods that are high in sodium, such as ready-made soups, canned food, bread and baked goods, and ready meals.
- When you are thirsty, drink water instead of sweetened beverages.
- You should enjoy food but eat smaller portions and avoid overeating.

The main idea behind the “MyPlate” nutrition guide, which was originally named “Choose My Plate”, is that it’s not really about avoiding a particular food, but it’s about making the right choice in food as well as the right portion size.



Basic dietary requirements of IBD patients

For most patients, the most important advice is to consume sufficient amounts of protein and have an adequate energy intake to maintain a healthy weight and ensure growth in children and adolescents. A daily energy intake of 30-35 kcal/kg and a daily dietary reference intake of 1 g of protein per 1.5 kg of body weight will meet the energy and protein requirements in most adult patients with active inflammatory bowel disease. Foods rich in protein such as fish, meat, eggs, and legumes that do not cause discomfort or complications, and lactose-free dairy products should form an essential part of IBD patient diet.

Many patients develop lactose (milk sugar) intolerance during the active disease period, and in Crohn's disease this condition occurs in a significant percentage of patients in remission. The lactase enzyme, produced by the cells in the mucous membrane, is needed to break down lactose. Since the inflamed membrane produces less lactase, the lactose molecules are not properly broken down and they remain in the gut where they can cause various complications because the body is unable to digest them. Therefore, it is recommended that patients avoid milk and dairy products that contain lactose during the active disease period. It is usually necessary to replace milk and dairy products with calcium-rich plant-based drinks and tofu. Fermented dairy products are usually lactose-free and are therefore usually recommended and safe for consumption, especially if they contain probiotics, but in case of a dairy-free diet, plant-based probiotics can be consumed as well.

The inflammatory bowel disease diet is created to suit the needs of each individual patient, and the following details should be considered while preparing a diet plan:

- Symptomatology (diarrhoea, abdominal pain, constipation, nausea...)
- Disease period: Remission vs. active disease
- Disease localisation
- Stenosis (narrowing) in the gastrointestinal tract
- Surgical procedures / bowel length
- Specific nutritional deficiencies (iron, vitamin B12, vitamin D, folate)
- Dietary requirements and patient experience with certain types of food
- Comorbidities
- Therapy

Micronutrient deficiencies and compensatory mechanisms in patients with inflammatory bowel disease

A large number of IBD patients have experienced various nutritional deficiencies at the time of diagnosis, which can worsen significantly as the disease progresses. These patients have macronutrient and micronutrient deficiencies, they often have reduced muscle mass, water-soluble and fat-soluble vitamin deficiency (B12, B6, folate, vitamin D, E, A, K), and mineral deficiency (iron, zinc, magnesium, selenium, calcium, potassium). Low nutrient intake is often associated with restrictive diet prescribed by a physician or self-managed by the patient. Restrictive diets that exclude entire food groups do not provide any clinical benefits and may result in a deficiency of various micronutrients.

Due to the specificity of the digestion and absorption site of various nutrients, the disease activity and localisation will determine the risk of specific micronutrient deficiencies. Therefore, **vitamin B12 deficiency** can develop in patients with

terminal ileitis, and **calcium and iron deficiency** can occur in cases of proximal small bowel involvement. In addition, a similar principle applies to patients who have had a small bowel resection and depending on the localisation and the length of the resected bowel, these patients will be more prone to developing certain deficiencies. Thus, **vitamin B12 and fat-soluble vitamin deficiency** may occur in cases of ileocaecal resection and calcium and iron deficiency can occur in cases of proximal small bowel resection.

Anaemia is one of the most frequent extraintestinal manifestations of inflammatory bowel disease (IBD). The prevalence of anaemia in IBD patients varies from 6 to 74%, and it occurs more frequently in hospitalised patients and patients with Crohn's disease than in those with ulcerative colitis. In IBD patients, anaemia increases morbidity, hospitalisation rate, costs and mortality. The addition of iron to therapy improves the quality of life in patients with inflammatory bowel diseases, independent of clinical disease activity. Peroral iron supplementation is the first-line therapy in patients with mild anaemia who are in clinical remission and who had no prior intolerance to oral iron supplements. Intravenous iron infusion is considered as the first-line therapy in patients with active disease, in those with prior intolerance to oral iron supplements, in those with haemoglobin levels below 100 g/L and in patients requiring erythropoiesis-stimulating agents.

In children and adults with inflammatory bowel disease who are in active disease period and using glucocorticoid therapy, the monitoring of **calcium and 25(OH)D** concentrations and replacement therapy dose (6,000–10,000 IU in the period of 8 weeks) should be included in confirmed cases of vitamin D deficiency. In resections involving more than 20 cm of the terminal ileum (regardless of the ileocecal valve) and in patients with Crohn's disease, vitamin B12 must be supplemented.

Approximately 13% of Crohn's disease patients have **calcium malabsorption**. This is due to binding of calcium to unabsorbed fatty acids in the intestinal lumen, vitamin D deficiency and the use of corticosteroids as IBD therapy forms.

However, it should be noted that calcium deficiency and hypocalcaemia are not synonymous. Even when calcium absorption is decreased, calcium levels in blood may be in the normal range as vitamin D and parathyroid hormone stimulate the release of calcium from bone. Therefore, hypocalcaemia is rarely reported in IBD patients unless vitamin D deficiency or hypoparathyroidism are also present. Low calcium levels in blood do not necessarily confirm the occurrence of hypocalcaemia. Approximately 40% of circulating calcium is bound to albumin, so hypoalbuminaemia is often accompanied by low levels of calcium in blood, without the disruption of free (ionised) calcium level which is a physiologically relevant component of blood calcium. For the prevention and treatment of osteopenia and osteoporosis, it is important to maintain a daily intake of 800 – 1000 mg of calcium through food and dietary supplements while maintaining an optimal vitamin D levels in blood.

Folate deficiency anaemia is observed in approximately 40% of adult patients with Crohn's disease and 60% of patients with ulcerative colitis. The diet of IBD patients often does not include sufficient amounts of folate-rich foods. Furthermore, sulfasalazine therapy increases the risk of folate deficiency anaemia because it can affect folate-binding activities in the intestines and interfere with folate absorption. The lack of folic acid may contribute to the occurrence of anaemia in patients with inflammatory bowel disease. Retrospective studies have shown that folic acid supplementation has a protective effect on precancerous conditions and colorectal cancer in patients with ulcerative colitis. Folic acid is prescribed with sulfasalazine and methotrexate. The recommended dose is 5 mg once a week, and it should be taken 24-72 hours after taking other drugs, or 1 mg per day for 5 days a week.

Selenium levels in blood and glutathione peroxidase activity may be reduced in patients with inflammatory bowel disease. Natural sources of selenium include meat, grains, nuts and fish. Selenium is also an integral part of the antioxidant enzyme in the body – glutathione peroxidase. Cases reported in the referenced literature link selenium deficiency to potentially fatal but reversible cardiomyopathy and irreversible encephalitis.

Approximately 40-50% of Crohn's disease patients have low serum **zinc** levels. However, serum zinc levels are in weak correlation with the total body zinc content and therefore, a clinically significant zinc deficiency is not likely to occur often. Deficiency is often reflected as a low levels of serum alkaline phosphatase, as alkaline phosphatase is a metalloenzyme. Severe zinc deficiency has been observed in patients with stomas, fistulas and diarrhoea.

Copper is an essential trace element required for the proper functioning of various enzyme systems, and it also plays an important role in normal iron absorption. Most patients show no signs of copper deficiency. Similar to zinc, severe copper deficiency was observed in patients with severe diarrhoea, fistulas or stomas.

Table 3 Overview of recommended food and food that should be limited during active disease period

Food group	Recommended	To be avoided
Grains and bread	<ul style="list-style-type: none"> • Gluten-free rusks and stale bread and baked goods • Cooked rice and rice flour derivatives • Quinoa • Whole-grain porridges and starchy vegetable purées (polenta, oatmeal, millet and buckwheat porridge, mashed potatoes, pumpkin or sweet potato mash) 	<ul style="list-style-type: none"> • Fresh bread and baked goods, layered yeast dough products, • Seed and bran bread • Gluten-containing grains (wheat, barley, rye) and their derivatives
Fruits	<ul style="list-style-type: none"> • Fruit compotes, puréed fruit • Peeled fresh fruit, if tolerated 	<ul style="list-style-type: none"> • Unpeeled fruit (if it causes symptoms) • Dried fruit (if it causes symptoms) • Citrus fruits • Fruit with small stones
Vegetables and legumes	<ul style="list-style-type: none"> • Boiled leafy greens, courgettes, pumpkin • Salads and microgreens exposed to thermal processing for a short period of time – watercress, lamb's lettuce and rocket • Puréed boiled seedless vegetables • Starchy tubers and roots • Mixed cooked legumes such as chickpeas, peas or red lentils, if they do not cause discomfort or complications 	<ul style="list-style-type: none"> • Bell peppers, cabbage, onions, kale, Brussels sprouts, cauliflower, rhubarb, mushrooms • Legumes (beans, green beans)

Food group	Recommended	To be avoided
Milk and dairy products and milk substitutes	<ul style="list-style-type: none"> • Fermented dairy products with probiotics and prebiotics • Yoghurt, acidophilus, kefir, soured milk • Fortified sugar-free plant-based beverages, tofu • Lactose-free milk and fresh cheeses 	<ul style="list-style-type: none"> • Fresh and long-life milk (if it causes symptoms) • Full-fat cheeses
Meat, fish, eggs	<ul style="list-style-type: none"> • Boiled, lean meats (chicken, turkey, veal, lamb, rabbit) and fish (hake, mackerel, scorpion fish, gilthead bream) • Oily fish in small quantities 	<ul style="list-style-type: none"> • Cured meats, roasts, pâtés, canned meat products, red meat • Shellfish and crustaceans
Soups	<ul style="list-style-type: none"> • Meat and fish soups with removed excess fat, puréed vegetable soups 	<ul style="list-style-type: none"> • Ready-made soups, heavily-seasoned soups and stews made with roux
Nuts	<ul style="list-style-type: none"> • Ground almonds and hazelnuts in limited quantities 	<ul style="list-style-type: none"> • Whole nuts and seeds
Spices	<ul style="list-style-type: none"> • Sea salt in limited quantities • Basil • Ginger • Turmeric 	<ul style="list-style-type: none"> • Red paprika • Vinegar • Pepper, mustard, curry, oregano, chili powder, garlic
Sweet food (sweets)	<ul style="list-style-type: none"> • Honey • Marmalade • Maple syrup and agave syrup, barley malt • Cakes and creams made with rice and semolina • Biscuits • Rice crackers • Chocolate with high cocoa content 	<ul style="list-style-type: none"> • Cookies, candy, cakes, puff pastry • Sorbitol sweetener and other artificial sweeteners • Table sugar • Chocolate
Beverages	<ul style="list-style-type: none"> • Spring water • Unsweetened herbal teas • Unsweetened fruit and vegetable juices 	<ul style="list-style-type: none"> • Alcohol • Coffee • Fizzy drinks and sugary drinks
Fats	<ul style="list-style-type: none"> • Olive oil and pumpkin seed oil • Flaxseed oil, canola oil, sunflower oil • Butter (in limited quantities) • Coconut oil 	<ul style="list-style-type: none"> • Mayonnaise • Cream • Lard

Dietary guidelines during various stages of inflammatory bowel disease

Active disease

- **Parenteral nutrition** (feeding of nutrients through intravenous infusion) is used in patients with a non-functional gastrointestinal tract that is unable to receive food or enteral formulas, in cases of narrowing (stenosis or stricture) in the gastrointestinal tract, distal fistulas, or short bowel syndrome.
- **Enteral nutrition** (feeding of nutrients to the gastrointestinal tract via feeding tube) has a beneficial effect on inflammatory bowel diseases and it is a method that is often used.

Oral diet

- Consume less high-fibre foods to relieve stomach pain and diarrhoea.
- If you have stenosis (narrowing) in your gastrointestinal tract, be sure to avoid nuts, seeds, popcorn, legumes and stone fruits. Some patients with this condition must rely solely on the intake of liquid or puréed foods.
- Avoid foods that may cause frequent bowel movements such as fresh fruits and vegetables, prunes and caffeinated drinks.
- If you are lactose intolerant, avoid foods that contain lactose. Lactose intolerance causes increased flatulence, gas build-up, cramps and diarrhoea within 30 to 90 minutes of consuming milk, ice cream or other dairy products.

- If your stool appears greasy and abnormally foul-smelling, this could be a sign of fat malabsorption. Fat malabsorption can be improved by eliminating or drastically reducing total fat intake and by introducing MCT (medium-chain triglycerides) oils. During this process, it is advisable to consult a doctor or nutritionist.
- Try to eat several small meals a day. This is vital for increasing the total nutritional intake while reducing the risk of food intolerance which may be caused by large amounts of food ingested in one sitting.
- Seek expert advice on oral administration of enteral formulas used as dietary supplements to your daily diet.

Continuation of diet after improvement of symptoms

- Start introducing liquid foods that you tolerate well, then gradually switch to solid food after a period of consuming puréed foods.
- Continue to follow a diet low in indigestible fibre and slowly introduce more varied foods.
- Every third day, introduce a new type of food to the menu, avoiding foods that make your symptoms worse.
- Introduce dietary fibre in the amount that you can tolerate, without the occurrence or worsening of symptoms. Sources of fibre that are usually well-tolerated include boiled puréed vegetables, cooked fruits and foods rich in starch such as cooked grains and rice and pasta.
- Try to eat a balanced diet which includes fruits, vegetables, grains, lean meats and fish, and low-fat dairy products.
- Gradually increase your calorie and protein intake. Abdominal pain, diarrhoea and reduced food intake, as well as the use of corticosteroids administered in the active disease period can cause poor nutritional status.

Recommendations of the first foods to be included in the diet after the symptoms have subsided

- Clear soups, diluted juices
- Apple, peach or pear compote or purée
- Oatmeal
- Overcooked, soft and sticky rice, carrot, celery, beets, sweet potatoes or pumpkin purée
- White meat in chicken or turkey, white fish
- Boiled or poached eggs, fermented dairy products

Dietary guidelines for ileostomy patients

Ileostomy is a surgically made opening in the small intestine, which is formed by pulling out the end of the small intestine (ileum) through the abdominal wall, inverting it and stitching it to the skin of the abdomen. Unlike the anus, the stoma does not have a sphincter muscle (which is under voluntary control), so there is no voluntary control over bowel movements. The consistency of digestive waste released from the ileostomy can range from liquid to pasty, depending on the intake of fluids, foods, medications, and other factors. Over time, the bowel should adapt to the alteration, which means that the waste coming out of the stoma should become thicker (it should have a consistency similar to yoghurt or porridge) and the average output ranges should be reduced to approximately 800 – 1000 mL per day.

General dietary guidelines for ileostomy patients:

- Eat slowly and chew your food well. Avoid talking while you are eating, chewing gum and fizzy drinks – all of this can result in air swallowing and bloating.
- Eat several small meals a day and do not skip meals. This will help you to regulate your stoma outputs. Avoid eating large meals in the evening because this will increase your ileostomy output during the night.

- Separate fluids from solid food. Drinking large amounts of fluids during a meal speeds up the passage of food through the digestive system, so we recommend drinking fluids half an hour before or half an hour to an hour after a meal.

As already mentioned, over time, your bowel will adjust, which means you will be able to consume a variety of foods. Patients should be cautious while consuming high-fibre foods, especially if they are not chewed well, because this may cause stoma occlusion (blockage). Insufficiently chewed or undigested food debris can block the opening of the stoma, especially if the stoma itself is smaller in diameter. In most cases, the occlusion will resolve spontaneously, but if symptoms persist, it is necessary to seek medical attention. On the other hand, high-fibre foods can further stimulate your bowel and cause diarrhoea. Foods high in lactose, fat and/or sugar have a similar effect on digestion.

Initially, in the period of ileostomy adjustment, the diet should be based on easily digestible foods – these are foods that are low in fibre, fat and lactose. After a minimum of two weeks, it is advisable to start gradually introducing “new” foods into the diet, one by one so you can identify the foods you cannot tolerate. If you are intolerant to certain foods, try reintroducing them after a few weeks/months, before eliminating them completely from your diet. It is generally recommended to consume certain types of foods with high fat and sugar content in limited quantities as they can induce increased stoma output.

Adequate hydration is an important component of the diet and is especially important for patients with ileostomy. To prevent dehydration, it is necessary to consume about 30 – 40 mL of fluid per kilogram of body weight. With the occurrence of diarrhoea, in addition to water, important electrolytes, especially sodium, are lost from the body. In ileostomy patients, diarrhoea is said to be present when there is a liquid watery stoma output which exceeds the amount of 1000 mL daily. If you notice an increased stoma output and you urinate less than you usually do, it is necessary to restore the fluids and electrolytes lost by drinking oral rehydration solutions (solutions with a high

content of sodium, potassium and chloride) in an amount of 500 to 1000 mL (depending on losses through the stoma and urinary frequency). You can also add extra salt to your food in order to make up for lost sodium. If you have a fever, if you are physically active or if it is the summer, drink plenty of fluids (50 mL / kg of body weight) and increase your salt intake.

Some ileostomy patients sometimes experience persistent problems with their stoma output frequency or stool consistency, and therefore need to take medications (e.g., loperamide) to control the stoma output.

Dietary guidelines for colostomy patients

During colostomy, the large intestine is brought through the abdominal wall and stitched to the skin of the abdomen to form an opening for the stool. In this way, the colon is redirected from the anus and the digestive system continues to function normally. In most cases, colostomy is temporary and after some time, with the appropriate clinical course, bowel continuity is established, but in some patients it can be permanent. Colostomy is usually emptied less frequently than ileostomy and usually takes less time to adjust.

It is common to allow your bowel to "rest" after surgery in order for it to completely heal and recover, so the patients receive all fluids and medications intravenously. After a short period (the duration of which is determined for each individual patient), tea, clear soups and freshly squeezed fruit juices are gradually introduced into the diet, followed by easily digestible foods such as cooked rice, oatmeal and toast.

Gradually introduce high-fibre foods into your diet (in small amounts) and be sure to monitor how your body responds to new foods. In addition to that, colostomy patients are more prone to constipation than diarrhoea, so it is extremely important to drink enough fluids, but also to check if the medications that you are taking are causing constipation.

The ultimate goal of every colostomy patient is to get back to eating normally and having a normal lifestyle. However, it is recommended to avoid certain food groups, which cause bloating, unpleasant odours and gas accumulation. Each patient requires an individual approach, so there are no universal recommendations. After the operation, it is recommended to slowly introduce foods that did not cause problems before the operation, and to introduce potentially problematic foods in small quantities and monitor how the body reacts. It would certainly be advisable to keep a diary of the symptoms and foods that cause them.

Foods that can cause problems and that should be consumed in limited quantities, include:

- Raw vegetables and raw fruits with the skin
- Fresh milk and eggs
- High-fibre foods
- Legumes (beans, peas, lentils, chickpeas)
- Vegetables from the cabbage family (kale, cabbage) and vegetables from the genus *Allium* (onion, garlic, leek)
- Seeds and nuts (that are not ground)
- Foods rich in added sugars and fats, fried and spicy foods
- Caffeine and alcohol

Bear in mind that certain foods can cause **unpleasant odours** (asparagus, beans, eggs, cabbage, cucumber, cauliflower, garlic, fish) which does not mean that you should completely eliminate them from your diet.

On the other hand, certain foods can help thicken outputs and reduce odours:

- Boiled potatoes, sweet potatoes, pumpkin, cornmeal
- Cooked white rice (soft and sticky rice)
- Probiotic yoghurt
- Bananas
- Compote and purée made from cooked apples
- Toast or rusks

Dealing with a stoma blockage

Certain foods can also cause stoma blockage that is accompanied by a range of symptoms including very watery stool, absence of bowel movements, abdominal pain and cramps, nausea, bloating, and vomiting. If you notice any of these symptoms, it is advisable to increase your fluid intake to restore normal digestion.

Additional tips!

- To help your digestion, make sure to chew your food well! Chewing is a very important part of food digestion which we often forget about.
- Also, avoid fizzy drinks, smoking or drinking through a straw, or anything that can cause swallowing large amounts of air.
- Remember to drink enough fluids. Make water, freshly squeezed juices, light herbal teas and vegetable soups your first choice.
- Eat several small, frequent meals during the day. Eat a larger meal in the afternoon to avoid increased stoma outputs during the night.
- Try to eat meals at the same time during the day to regulate bowel movements.
- Add healthy fats into your diet. Make vegetable oils, such as olive oil, primary sources of fat in your diet

Staying active with a stoma – it's definitely possible!

One would think that physical exercise and stoma are an impossible combination, but it certainly doesn't have to be that way. If light physical activity was part of your daily routine before surgery, there is no reason for it to be different after surgery. Patients should rest for the first 12 weeks after surgery to allow the bowel to heal properly. After that, it is recommended to start taking light walks and introducing breathing and stretching exercises into your routine. Be sure to listen to your body and find an exercise that suits your needs, because it is possible to stay fit even with a stoma!



Diet therapy for inflammatory bowel disease

Diet therapy and clinical nutrition have a significant role in the treatment of patients with inflammatory bowel disease. There are different types of nutritional interventions which include diet therapy, the use of artificial nutrition (enteral and/or parenteral nutrition), micronutrient supplementation and the use of pharmaconutrients as a nutritional support therapy. The diet of patients in remission generally does not differ significantly from the usual diet of the healthy population, however, it is advisable to align dietary guidelines with individual needs and condition of the patients and avoid foods that exacerbate complications even in the "silent" phase of the disease.

Elimination diets

Elimination diets are eating plans which eliminate certain foods from the diet which may cause allergic reactions or trigger irritations. The results of clinical studies in which such diets have been used have shown a significant improvement in patients with inflammatory bowel disease, when conducted under professional supervision. The diet is carried out in such a way that for at least two weeks all foods suspected of triggering allergic reactions or irritating the bowels are eliminated from the diet. After these two weeks, the eliminated foods are slowly reintroduced into the diet (every third day), while recording any symptoms that may indicate allergic reactions or irritations, including gastrointestinal symptoms, in order to detect foods that are possible triggers for patients.

Foods that are most often eliminated:

- saturated fats and very fatty foods – in larger quantities present in animal and dairy products and processed foods
- dairy products – some people cannot digest milk sugar (lactose). However, some lactose intolerant patients can eat yoghurt with active bacterial cultures, which may help with inflammatory bowel disease.
- foods that can cause or intensify inflammation (alcohol, simple sugars and caffeine)
- gluten-containing products (wheat, oats, barley)
- foods that can cause allergic reactions (wheat, milk, eggs, peanuts, shellfish, fish, soy)
- foods that can irritate the digestive system (vegetables from the cabbage family)
- foods that can cause bloating (legumes, mushrooms and vegetables from the cabbage family)
- foods containing preservatives and emulsifiers

Foods rich in oxalates may increase the risk of developing kidney stones, which is a common complication in patients who undergo extensive bowel resections. Therefore, these patients should avoid or consume chocolate, cocoa, black tea, pepper, spinach, beetroot and parsley in limited quantities.

While following the elimination diet, it is useful to keep a food diary in which you should write down the type and amount of food consumed daily, the time of food consumption and symptoms that occur after a meal.

Food diary

Food and amount	Time	Symptoms / Comments

Dietary factors are involved in the initiation and perpetuation of inflammation and may be connected to the clinical course of the disease. Different specific dietary approaches have been scientifically tested in a limited number of studies and they have proved to be beneficial in their effect on inflammation and mucosal healing, impact on microbiota composition and reduction of disease activity. In one of the most recent studies, faecal microbiota transplantation (FMT) was used in combination with a special exclusion diet (UCED) in patients with refractory ulcerative colitis. The results showed that the UCED was more effective when it was used as the only method, and it was proved to be safer than the intervention based on the combination of FMT + UCED.

Although patients are often prone to testing various popular diets, the best approach is always the personalisation of an elimination diet carried out under professional supervision. Some of the popular diets or their segments might be appropriate for diet therapy. The most common dietary approaches and/or popular diets for IBD are listed in Table 4..

Table 4
Overview
of dietary
approaches
for IBD

Name	Characteristics
Crohn's Disease Exclusion Diet (CDED)	Diet that excludes all foods that may be potentially harmful for Crohn's disease, divided into three phases and used in combination with partial enteral nutrition (PEN). The first two phases of the diet contain mandatory foods (e.g., chicken breast, boiled potatoes, eggs, apples, bananas), and the third phase does not include any mandatory foods. The diet is low in gluten-containing grains and rich in vegetables and fruits.
Ulcerative colitis exclusion diet (UCED)	Diet rich in fruits and vegetables, with prescribed amounts of chicken, eggs, and yoghurt, decreased exposure to sulphated amino acids, total protein, haem, animal fat, saturated fat and food additives. Increased exposure to tryptophan and natural sources of pectin and resistant starch.
CD-TREAT	Prescriptive and personalised diet that recreates exclusive enteral nutrition by the exclusion of certain dietary components (e.g., gluten, lactose, and alcohol) and matching of others (macronutrients, vitamins, minerals, and fibre) as closely as possible using ordinary food.
Mediterranean diet	Diet rich in vegetables, fruits, olive oil, pulses, cereals, fish and seafood, moderate in poultry and dairy products and with a low intake of red meat, sweets and processed foods.
IBD - AID	Whole foods diet consisting of lean meats, poultry, fish, eggs, selected sources of carbohydrates, certain types of fruits and vegetables, nut and legume flours, homemade cultured yoghurt, kefir, miso and other cultured products. Probiotics and omega-3 fatty acids are recommended in this diet. Diet should be personalised with the help of a skilled dietitian.
Autoimmune protocol (AIP) diet	Severe limitation of grains, legumes, vegetables from the nightshades family, dairy products, eggs, refined sugars, sweets, alcohol, coffee, nuts and seeds, additives. Personalised reintroduction of selected foods in addition to lifestyle changes.
Gluten-free diet	Strict elimination of gluten from the diet.
Specific carbohydrate diet (SCD)	Significant decrease of dietary sources of complex carbohydrates (grains) and elimination of refined sugar.

Name	Characteristics
Low – FODMAP diet	Diet limiting fructose, lactose, fructans, galactans and polyols, thereby excluding poorly absorbed and fermentable short-chain carbohydrates.
GAPS protocol	GAPS (Gut And Psychology Syndrome) diet is a strict elimination diet that limits grains, dairy, starchy vegetables, and refined carbohydrates. During the first step of the diet, homemade bone broth, juices with probiotics and ginger, mild teas with honey, and a small amount of homemade yogurt or kefir are allowed. Gradually, more foods are introduced according to the protocol, step by step.
Vegetarian and plant-based diets	A wide range of dietary patterns that contain low amounts of animal products and high amounts of plant products such as vegetables, fruits, whole cereals, legumes, nuts and seeds.

Enteral nutrition

Enteral nutrition is an extremely important part of nutritional treatment in inflammatory bowel disease, and in some cases it is even used as a primary therapy. The reason for the introduction of exclusive enteral nutrition (EEN) in children with Crohn's disease is to prevent the side effects of malnutrition on growth, and to avoid or delay the introduction of corticosteroid therapy. The studies conducted on the paediatric population have shown similar efficacy of corticosteroids and exclusive enteral nutrition, and in some situations exclusive enteral nutrition is superior to glucocorticoid therapy in children. Although previous studies have suggested the benefits of exclusive enteral nutrition, especially in the paediatric population, recent meta-analyses suggest the potential benefit of using exclusive enteral nutrition in adult patients as well. It is believed that worse results are recorded in the adult population due to poor cooperation and adherence compared to children and the fact that in adult patients enteral nutrition is often introduced too late for therapeutic purposes, usually only after the ineffectiveness of standard drug therapy and

consequent development of complications with impaired nutritional status. In contrast, in children, nutritional therapy is introduced in the early stages, immediately after diagnosis.

Enteral nutrition is most effective when given as the only food source (exclusive enteral nutrition), with water, over a long period of time, usually 6 to 8 weeks, and is more effective when used in the early stages of the disease and in cases where changes affect the small intestine or small and large intestine.

Partial enteral nutrition combined with elimination diet is another option that has been gaining ground over the last few years. Such an approach involves the intake of partial enteral nutrition in the amount of 25 - 50% of energy needs, and the rest is met through a diet that is adapted to patients with inflammatory bowel disease (so-called elimination diet).

Most recent qualitative research studies are related to the elimination diet specifically designed for Crohn's Disease Exclusion Diet (CDED). This diet is divided into three phases and combines a strict elimination diet that is gradually liberalised with the use of partial enteral nutrition. The first phase of the diet lasts for six weeks, and in that period 50% of energy needs are met through enteral nutrition, and a normal diet includes foods that must be consumed daily such as white poultry, eggs, potatoes, bananas and selected vegetables, fruits, grains and foods of animal origin. All processed foods, gluten-containing grains, milk and dairy products, and many other foods are not allowed. In the second phase of the diet, after six weeks, additional foods are introduced that are still strictly prescribed, and the share of energy provided from enteral nutrition is reduced to 25%. The third phase of the diet that occurs after 12 weeks resembles the well-known models of healthy eating and it is desirable to adhere to this diet in the long term. The introduction of patients to the CDED diet and monitoring of patients with Crohn's disease that follow the aforementioned diet (also known as the "ModuLife" diet), is performed exclusively by a healthcare professional – a physician or dietitian/clinical nutritionist. In addition

to that, this diet model has been proven by several studies as a therapeutic approach that can help achieve remission in patients, and it can also be used in addition to other, conventional treatment methods, including biological therapy.

Parenteral nutrition

Parenteral nutrition (PN) is used in cases in which the gut cannot absorb an adequate amount of nutrients due to poor intestinal absorptive capacity, i.e., in cases in which enteral nutrition cannot be carried out in an appropriate manner. Parenteral nutrition is indicated in patients with intestinal failure, for example in cases of intestinal obstruction when it is not possible to place a feeding tube behind the obstruction site, or in patients with short bowel syndrome resulting in severe nutrient malabsorption or severe loss and disturbance of fluids and electrolytes which cannot be restored enterally and which could potentially pose a threat to patient safety. In patients with disease complications such as high output fistulas, parenteral nutrition should be considered. Parenteral nutrition is also indicated in cases of malnourished patients or those at risk of malnutrition who do not tolerate enteral nutrition or in whom adequate nutrient intake cannot be achieved enterally.

Parenteral nutrition can be infused into a central or peripheral vein. Central or peripheral access is determined by the expected duration of parenteral nutrition. Parenteral nutrition must be carefully tailored to meet the needs of each individual patient. The intensity of malabsorption and intestinal losses will affect the prescribing of non-protein calories and amino acids, and especially water and electrolytes. Long-term PN, especially home parenteral nutrition (HPN), should contain all micro and macronutrients according to the system of "all-in-one" nutrient solutions and it can be reduced to a minimum or discontinued, depending on the improvement of nutritional status.

The most common complications of PN in IBD patients are infectious (catheter-related sepsis), metabolic (electrolyte imbalance, hyperglycaemia), and mechanical, which are usually associated with CVC insertion (pneumothorax and catheter dislocation, damage and occlusion). Special attention should be paid to the restoration of electrolyte balance, especially sodium and magnesium in patients with short bowel syndrome, and the restoration of phosphate balance in malnourished patients.



Role of microbiota and the use of probiotics

The term “microbiota” refers to a whole population of microorganisms that colonise the gastrointestinal tract or other organs and organ systems. A healthy microbiota is a balanced system composed of various microorganisms that have a positive effect on the body, but also certain bacteria and microorganisms that can potentially cause pathological conditions. Dysbiosis occurs when the balance of the gut microbiota is disrupted, i.e., when there is overgrowth of potentially pathogenic bacteria, which can cause a host metabolic or immune response. The most common causes of dysbiosis are various environmental factors such as diet, stress, antibiotics and the presence of various infections.

The microbiota of IBD patients differs significantly from that present in healthy individuals, it is characterised by a smaller number and diversity of microorganisms, and it is also reminiscent of a condition known as dysbiosis. Scientific studies conducted on patients with ulcerative colitis indicate a change in the composition of bacterial species, namely a decrease in bacteria of the phylum Firmicutes and an increase in the proportion of bacteria of the phylum Proteobacteria. In addition to that, a significant reduction in a number of protective bacterial species of different genera such as *Bacteroides*, *Eubacterium* and *Lactobacillus* has been observed.

Faecal microbiota transplant (FMT) has been widely recognised as an approach that highlights the central role of microbiota in maintaining health. FMT is the process of transferring faecal bacteria from a healthy individual into the gastrointestinal system of a patient with gut microbiota imbalance. The procedure of faecal transplant helps achieve a radical change in the microbiota composition of the recipient, who receives the microbiota of a healthy donor by way of transferring it via

enemas, probes or orally using specially formulated capsules. This procedure is especially useful for patients with *Clostridium difficile* infection, who may develop problems ranging from diarrhoea to pseudomembranous colitis and is also considered in other indications such as inflammatory bowel disease, certain metabolic and autoimmune diseases, and obesity.

Use of probiotics in patients with inflammatory bowel disease

The World Health Organization defines probiotics as “live microorganisms which, when administered in adequate amounts, confer a health benefit on the host”. For example, bacteria of the genera *Lactobacillus*, *Bifidobacterium* and *Streptococcus thermophilus* are some of the thoroughly researched probiotic strains that have a proven immunomodulatory effect and preserve the integrity of the intestinal barrier.

According to European and Croatian guidelines for clinical nutrition in inflammatory bowel disease, therapy with probiotic preparations – the *Escherichia coli* Nissle 1917 strain or a mixture of 8 strains: *Lactobacillus paracasei*, *Lactobacillus plantarum*, *Lactobacillus acidophilus*, *Lactobacillus delbrueckii* subspecies *bulgaricus*, *Bifidobacterium longum*, *Bifidobacterium infantis*, *Bifidobacterium breve* and *Streptococcus thermophilus* – can be considered in patients with mild-to-moderate ulcerative colitis to maintain remission. Administration of this mixture of probiotic bacteria causes positive changes in the composition of the bacterial microbiota, faecal biochemistry and gastrointestinal motility.

In patients with ileal pouch-anal anastomosis (IPAA), in approximately 50% of cases pouchitis may occur, which includes symptoms such as diarrhoea, increased bowel frequency, abdominal cramps, faecal urgency, tenesmus, and incontinence. Double-blind placebo-controlled studies have shown the effect of the aforementioned mixture of 8 probiotic strains in maintaining remission in patients with chronic pouchitis. Various studies

have also shown an effect on reducing relapse in chronic inflammation of the ileoanal pouch in the group of subjects who have used the aforementioned probiotic mixture as opposed to the group receiving placebo treatment.

For patients with ileoanal pouch or ileoanal pouch inflammation (pouchitis), the use of the same 8-strain probiotic preparation is recommended if antibiotic therapy fails, and this preparation is also recommended for both primary and secondary prevention of ileoanal pouch inflammation.

In conclusion, the importance of the microbiota as a separate entity involved in the immune response should not be overlooked. A diet rich in fruits, vegetables, grains and fermented foods and the use of adequate probiotic preparations can help in the treatment of various diseases and disorders of the gastrointestinal system, both in healthy individuals and IBD patients. However, this diet is also increasingly used as a support therapy and for the prevention of metabolic and autoimmune diseases and the stimulation of the immune system.



Pharmaconutrients

Over the last few years, the use of various pharmaconutrients in the treatment of IBD has been discussed in numerous studies. There is extensive scientific evidence which highlights the major role of nutrients such as vitamin D, transforming growth factor beta (TGF- β), curcumin and omega-3 fatty acids in the possible prevention or treatment of IBD.

Vitamin D

Low vitamin D levels are associated with inflammatory bowel diseases and vitamin D replacement therapy, which has shown great potential and therapeutic benefits in the treatment of this disease. Vitamin D has multiple potential beneficial effects on gastrointestinal inflammation which are produced through different mechanisms of action. Extensive evidence shows that vitamin D is one of the protagonists in the complex interplay of the gut microbiota and immune system modulation. Vitamin D is important for maintaining the integrity of the intestinal epithelial barrier and for modulating the intestinal immune system, and low blood levels of vitamin D are associated with increased intestinal permeability and consequent metabolic endotoxemia associated with inflammation. Vitamin D replacement therapy can cause changes in the composition of the gut microbiota. The active metabolite (1,25-dihydroxyvitamin D) binds to the receptors in various tissues, including immune system cells, in which it regulates gene expression modulation. Various intervention studies have highlighted the potential of vitamin D use in reducing the value of inflammatory markers.

The concentration of vitamin D in the blood at which such an effect is manifested is in the range of 75-100 nmol/L and it is desirable to periodically monitor the blood level of vitamin D in IBD patients. Increased incidence of vitamin D deficiency is extremely evident in patients with Crohn's disease, and recent studies indicate that the clinical disease activity and

the patients' quality of life are in strong correlation with the concentration of vitamin D in the blood, which indicates the need for replacement therapy.

Although there is still no optimal protocol for the replacement of vitamin D in inflammatory bowel disease, it is recommended to achieve a concentration of vitamin D in the blood between 75 and 125 nmol/L. This value has been shown to be a safe dose and it may have a beneficial effect on disease activity. It is considered that the daily dose for this population should be between 1,800 – 10,000 IU, while bearing in mind that the use of doses higher than 4,000 IU requires direct medical supervision along with the monitoring of laboratory parameters..

Transforming growth factor-beta 2 (TGF-β2)

Transforming growth factor-beta (TGF-β) is a multifunctional regulatory peptide that affects various types of host cells. TGF-β is best known for its effect on cell growth and differentiation and immunoregulation. Like many cytokines in the intestinal mucosa, it can have autocrine and paracrine effects and control the differentiation, proliferation and activation of lymphocytes, macrophages and dendritic cells. Therefore, it plays a role in the mechanisms of tolerance, prevention and autoimmunity and anti-inflammatory processes. Enteral formulas rich in TGF-β, can be used as the only source of nutrients in the active period of Crohn's disease (CD) or as a form of support therapy in remission, which is one of the basic principles of treatment of the paediatric population. Only a few studies have examined the use of such nutrient-enriched formulas in cases of ulcerative colitis (UC), so additional studies need to be conducted in reference to this indication.

Curcumin

Curcumin is the main chemical compound produced by plants of the *Curcuma longa Linn* species. It has a characteristic



bright yellow pigment of the turmeric powder obtained by extracting the rhizome from the aforementioned plant. It is described as the most active ingredient in turmeric and as an active biological compound with anti-inflammatory, antioxidant, immunomodulatory, proapoptotic and antiproliferative effects. Two small, placebo-controlled randomised trials of curcumin replacement therapy have shown promising results for patients with ulcerative colitis (UC). In a study of 50 patients with active disease, despite the maximum dose of 5-aminosalicylates, the addition of curcumin (3 g/day) was superior to the combination of placebo and 5-aminosalicylates in inducing clinical remission, clinical response, and reduced mucosal inflammation. In a similar manner, a dose of 1 g of curcumin administered 2 times a day in combination with sulfasalazine or mesalazine was also superior to placebo. It is necessary to conduct additional research and highlight the fact that isolated curcumin preparations were used in the conducted studies.

Omega-3 fatty acids



Given that inflammation is a fundamental pathophysiological process in IBD, the anti-inflammatory effect of omega-3 polyunsaturated fatty acids found in fatty fish and krill oil can be beneficial to IBD patients. Supplementation with EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) is recommended. A three-year study published in the Journal of Gastroenterology found that patients with Crohn's disease who consume a diet rich in omega-3 fatty acids have a significantly lower rate of relapse than patients who do not consume fatty fish or omega-3 fatty acids. Salmon, tuna, herring and sardines are dietary sources rich in EPA and DHA.

Furthermore, several other studies have shown that fish oil (i.e., omega-3 fatty acids) reduces inflammation and the need for anti-inflammatory drugs and promotes the achievement of adequate body weight in patients with ulcerative colitis. Relatively high doses of EPA and DHA, ranging between 2 and 3 grams, were used in the conducted studies.

Concluding remarks

- Nutritional support therapy is an important component of IBD patient treatment which includes malnutrition prevention and treatment.
- A targeted and pragmatic improvement in nutritional status can ultimately improve the outcome of IBD patients. Therefore, screening and malnutrition treatment programme should be initiated and conducted under the supervision of a trained multidisciplinary team.
- There are different types of nutritional interventions which include diet therapy, the use of artificial nutrition (enteral and/or parenteral nutrition) which can contribute to the daily energy intake, micronutrient supplementation, such as vitamin B12, iron, folic acid, calcium and vitamin D, and the use of pharmaconutrients as a nutritional support therapy.
- Recent studies include extensive scientific evidence which highlights the importance of pharmaconutrients such as vitamin D, transforming growth factor beta (TGF- β 2), curcumin and omega-3 fatty acids.



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Recipes





Overnight oats with apples and cinnamon

Ingredients:

- 6 tablespoons of fine oats
- 2 dL of almond and coconut milk (unsweetened)
- 1 tablespoon of chia seeds
- 1 teaspoon of agave syrup
- 1 small apple
- a pinch of salt
- 1 teaspoon of cinnamon
- coconut flakes or sliced almonds to sprinkle on top

Preparation:

Mix oats, chia seeds, and almond and coconut milk in a bowl. Refrigerate overnight. In the morning, peel an apple, cut it into smaller pieces, put it in a pot with a pinch of salt, a bit of agave syrup and cinnamon and cook the mixture briefly while mixing until it softens. Add the apple mixture to overnight oats and sprinkle with coconut flakes or sliced almonds.

Overnight oats with apples and cinnamon

Nutrition facts

Per serving		% DV*
Calories	2065.7 kJ / 493.4 kcal	25%
Total fat	10.3 g	15%
Saturated fat	2.4 g	12%
Monounsaturated fats	2.1 g	
Polyunsaturated fats	4.5 g	
Carbohydrates	73.5 g	
Sugars	20 g	
Starch	52.6 g	
Dietary fibre	17.7 g	
Protein	14 g	28%
Salt	0.6 g	11%
Vitamin C	8 mg	10%
Vitamin A	153.7 µg	38%
Calcium	376.8 mg	47%
Iron	6.1 mg	44%

* Percent Daily Value (DV)

BREAKFAST IDEAS

Millet and amaranth porridge

Ingredients (serves 1):

- 1/4 cup of millet
- 1/8 cup of amaranth
- 1 tablespoon of honey
- 1 apple
- about a cup of almond milk
- a pinch of salt
- a pinch of cinnamon
- a handful of fresh or frozen berries (optional)

Preparation:

Peel the apple and grate it. Rinse the millet and amaranth with cold water, strain the mixture and add the almond milk. Bring to a boil over high heat, add a pinch of salt, reduce heat, and let it simmer over low heat with the lid on for approximately 20 minutes while occasionally stirring. If needed, add more almond milk or water. Finally, add the grated apple, honey and cinnamon and mix everything well. Serve with berries of choice.

Millet and amaranth porridge

Nutrition facts		
Per serving		% DV*
Calories	1982.2 kJ / 473.4 kcal	24%
Total fat	6.5 g	9%
Saturated fat	1 g	5%
Monounsaturated fats	2.3 g	
Polyunsaturated fats	2.4 g	
Carbohydrates	87.3 g	
Sugars	43.4 g	
Starch	40.4 g	
Dietary fibre	12.4 g	
Protein	9.9 g	20%
Salt	0.9 g	15%
Vitamin C	15.3 mg	19%
Vitamin A	43.8 µg	11%
Calcium	562.1 mg	70%
Iron	4.5 mg	32%

* Percent Daily Value (DV)



BREAKFAST IDEAS

Spring breakfast with asparagus

Ingredients (serves 2):

- 2 large slices of homemade sourdough bread
- extra virgin olive oil
- 12 asparagus (green, cultivated or wild asparagus)
- 2 large free-range eggs
- Parmesan cheese (optional)

Preparation:

Toast the bread in the pan, over high heat. Once it is crisp and golden brown, remove it from the pan to a plate or board, and brush it with some olive oil. Remove the woody ends of the asparagus and blanch them in salted water for up to 5 minutes. Drain the asparagus and put them on top of the toasted bread. Poach two eggs for a couple of minutes in water with some salt and vinegar. Put each egg over the asparagus, and sprinkle with a bit of Parmesan cheese (optional).



Spring breakfast with asparagus

Nutrition facts

For 1 person		% DV*
Calories	1404.4 kJ / 335.4 kcal	17%
Total fat	14.1 g	20%
Saturated fat	3.1 g	16%
Monounsaturated fats	7.3 g	
Polyunsaturated fats	2.1 g	
Carbohydrates	34.4 g	
Sugars	4.7 g	
Starch	28.3 g	
Dietary fibre	3.2 g	
Protein	15.6 g	31%
Salt	1.2 g	20%
Vitamin C	6.9 mg	9%
Vitamin A	353 µg	88%
Calcium	87.9 mg	11%
Iron	4 mg	28%

* Percent Daily Value (DV)

BREAKFAST IDEAS

Protein bread

Ingredients:

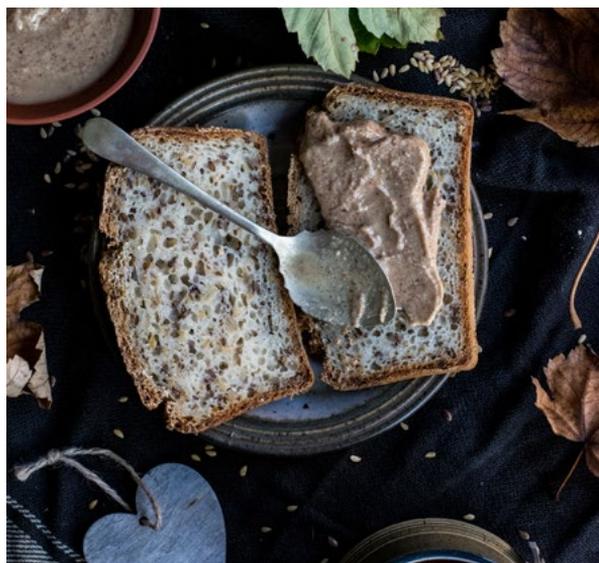
- 500 g of low-fat cottage cheese
- 250 g of fine oats
- 3 whole eggs
- 1 teaspoon of salt
- 1 teaspoon of baking soda
- 2 tablespoons of extra virgin olive oil
- 1 tablespoon of ground flaxseed
- 1 tablespoon of chia seeds (that were soaking for 10 minutes in 2 tablespoons of water)

Preparation:

First, make sure to mix the cottage cheese, eggs and salt. Then, add olive oil, ground and soaked flaxseed, and, finally, add oats and baking soda. Stir the mixture until it becomes smooth. Cover the loaf pan with parchment paper. Pour the mixture into the pan and bake for about 45 minutes at 180 °C until golden.

Protein bread		
Nutrition facts		
Per 100 g		% DV*
Calories	837.5 kJ / 200 kcal	10%
Total fat	8 g	11%
Saturated fat	1.9 g	10%
Monounsaturated fats	3.6 g	
Polyunsaturated fats	1.6 g	
Carbohydrates	17.8 g	
Sugars	2.6 g	
Starch	15.3 g	
Dietary fibre	3.2 g	
Protein	11.2 g	22%
Salt	1.4 g	23%
Vitamin C	0 mg	0%
Vitamin A	61.8 µg	15%
Calcium	88.3 mg	11%
Iron	1.6 mg	11%

* Percent Daily Value (DV)



BREAKFAST IDEAS

Oat and banana smoothie

Ingredients (serves 1):

- 1 large banana
- 3 tablespoons of oats
- 2 dL of oat milk (or other types of plant-based milk)
- 1 teaspoon of agave syrup
- a handful of blueberries or cinnamon (optional)

Preparation:

Combine all ingredients in the blender and serve immediately.



Oat and banana smoothie

Nutrition facts

Per serving		% DV*
Calories	1463.1 kJ / 349.5 kcal	17%
Total fat	3.6 g	5%
Saturated fat	0.7 g	3%
Monounsaturated fats	1 g	
Polyunsaturated fats	1.2 g	
Carbohydrates	67 g	
Sugars	29.2 g	
Starch	32.6 g	
Dietary fibre	9.9 g	
Protein	7.9 g	16%
Salt	0.2 g	4%
Vitamin C	20.2 mg	25%
Vitamin A	165 µg	41%
Calcium	266.1 mg	33%
Iron	2.7 mg	19%

* Percent Daily Value (DV)

LUNCH OR DINNER IDEAS

Creamy carrot and ginger soup

Ingredients (serves 4):

- 3 tablespoons of olive oil
- 6 – 7 large carrots
- 2 small onions*
- 10 g of grated ginger
- salt
- 0.5 L of vegetable stock
- 0.5 L of water
- 1 tablespoon of chopped parsley

Preparation:

Peel and finely chop the onions and peel the carrots and cut them into thin slices. Heat the oil in a medium-sized pot and add chopped vegetables, a pinch of salt, and stir until the onions become translucent. Add vegetable stock, water and grated ginger. When the liquid comes to a boil, reduce heat, cover with a lid and let it simmer for another 15 minutes. Use an immersion blender to make vegetable puree or put the vegetables in a food processor and serve topped with chopped parsley.

*if you don't tolerate onions, you can leave them out

Creamy carrot and ginger soup

Nutrition facts

For 1 person		% DV*
Calories	679.5 kJ / 162.3 kcal	8%
Total fat	10.7 g	15%
Saturated fat	1.6 g	8%
Monounsaturated fats	7.4 g	
Polyunsaturated fats	1.2 g	
Carbohydrates	12.3 g	
Sugars	7.5 g	
Starch	1.8 g	
Dietary fibre	3.9 g	
Protein	1.7 g	3%
Salt	0.8 g	13%
Vitamin C	11.8 mg	15%
Vitamin A	5414.5 µg	1352%
Calcium	49.9 mg	6%
Iron	0.6 mg	4%

* Percent Daily Value (DV)



LUNCH OR DINNER IDEAS

Roasted pumpkin soup

Ingredients (serves 4):

- 1 medium-sized pumpkin (e.g. butternut squash)
- 4 large carrots
- 1 large red onion or 2 small shallots*
- 1 tablespoon of olive oil
- a bit of ginger
- 7 dL of vegetable stock
- salt
- pumpkin seeds and pumpkin seed oil (optional)

Preparation:

Cut the pumpkin in half and remove the seeds. You don't have to peel it, just cut it into slices. Peel and cut the carrots and onions into larger pieces, place them on parchment paper and roast at 180 °C for 30 minutes or until tender. After the vegetables are done, remove the skin from the pumpkin and puree the vegetables with an immersion blender. Add the stock and grated ginger to the pureed vegetables and let everything simmer for a couple of minutes. Add salt to your liking. Serve with pumpkin seeds or with a drizzle of pumpkin seed oil.

* if you don't tolerate onions, you can leave them out



Roasted pumpkin soup

Nutrition facts

For 1 person		% DV*
Calories	638.6 kJ / 152.5 kcal	8%
Total fat	4.4 g	6%
Saturated fat	0.6 g	3%
Monounsaturated fats	2.7 g	
Polyunsaturated fats	0.8 g	
Carbohydrates	20.7 g	
Sugars	8 g	
Starch	7.2 g	
Dietary fibre	8.1 g	
Protein	3.2 g	6%
Salt	0.6 g	10%
Vitamin C	36.4 mg	46%
Vitamin A	8419.2 µg	2103%
Calcium	101.9 mg	13%
Iron	1.6 mg	11%

* Percent Daily Value (DV)

LUNCH OR DINNER IDEAS

Poached hake with boiled baby carrots and potatoes

Ingredients:

- 300 g of hake fillet
- 100 g of carrots
- 100 g of potatoes
- 2 tablespoons of extra virgin olive oil
- a pinch of salt

Preparation:

Pour 1 litre of water into the pot, add onions sliced into rings, unpeeled garlic, tomatoes, carrots, celery, a bay leaf and olive oil. Let it simmer for 30 minutes, add a pinch of salt and then add whole hake fillets, a teaspoon of vinegar and let it simmer for another 20 minutes. Serve the hake fillet with boiled potatoes and drizzle a tablespoon of extra virgin olive oil over it.

Poached hake with boiled baby carrots and potatoes

Nutrition facts

Per serving		% DV*
Calories	2695 kJ / 643.7 kcal	32%
Total fat	32.8 g	47%
Saturated fat	4.9 g	25%
Monounsaturated fats	20.7 g	
Polyunsaturated fats	5.2 g	
Carbohydrates	22.3 g	
Sugars	5.7 g	
Starch	14.5 g	
Dietary fibre	5.2 g	
Protein	58.7 g	117%
Salt	3.4 g	56%
Vitamin C	17.9 mg	22%
Vitamin A	5043.8 µg	1260%
Calcium	84.4 mg	11%
Iron	2.7 mg	19%

* Percent Daily Value (DV)





Poached salmon with carrot and celery purée

Poached salmon

Ingredients (serves 2):

- skinless salmon fillet, 2 pieces
- white wine, 100 mL
- 1 large shallot, chopped into large pieces
- 1 bay leaf
- salt

Preparation:

Put salmon fillets in a sauté pan. Add the shallot, bay leaf, wine, and boiling water to the pan, so that it covers the salmon fillets. Simmer over low heat for about 10 minutes. Remove the salmon from the pan, put it on a serving plate, dry it with a paper towel and add a pinch of salt. In the meantime, prepare the carrot and celery purée and sweet potato chips. Poached salmon with carrot and celery purée and sweet potato chips should be served with a watercress salad with lemon juice dressing, and a drizzle of olive oil.

Carrot and celery purée

Ingredients (serves 2):

- celery root, 200 g
- carrots, 200 g
- butter or olive oil, 10 – 15 g
- 1/4 teaspoon of salt

Preparation:

Boil the celery root and carrots in a bit of water, drain the boiled vegetables, add a bit of butter or oil, add some salt and mash them into a purée.

Poached salmon with carrot and celery purée

Nutrition facts

For 1 person		% DV*
Calories	1535.8 kJ / 366.8 kcal	18%
Total fat	14.3 g	20%
Saturated fat	2.2 g	11%
Monounsaturated fats	7.2 g	
Polyunsaturated fats	4 g	
Carbohydrates	17 g	
Sugars	7.6 g	
Starch	2.9 g	
Dietary fibre	5 g	
Protein	30.9 g	62%
Salt	0.8 g	13%
Vitamin C	14.8 mg	19%
Vitamin A	5060 µg	1264%
Calcium	93.1 mg	12%
Iron	2.1 mg	15%

* Percent Daily Value (DV)

Sweet potato chips

Ingredients (serves 2):

- 1 medium-sized sweet potato
- olive oil
- salt
- pepper
- spices of choice (cayenne pepper, dried rosemary, chili powder, garlic)

Preparation:

Preheat the oven to 180 °C. Cut the sweet potato into thin slices or sticks, preferably of similar size so the thinner pieces wouldn't burn. Put the sweet potato slices or sticks on parchment paper, drizzle with a bit of olive oil, and season them with your spices of choice. Reduce the oven temperature to 160 °C and immediately put the chips into the oven. Bake for 30 – 40 minutes, often checking to make sure that the chips do not burn.



Sweet potato chips

Nutrition facts

For 1 person		% DV*
Calories	636.8 kJ / 152.1 kcal	8%
Total fat	6.9 g	10%
Saturated fat	1 g	5%
Monounsaturated fats	5 g	
Polyunsaturated fats	0.7 g	
Carbohydrates	18 g	
Sugars	4.3 g	
Starch	13.4 g	
Dietary fibre	3.6 g	
Protein	1.7 g	3%
Salt	0.3 g	6%
Vitamin C	2.8 mg	3%
Vitamin A	4352.6 µg	1087%
Calcium	42.8 mg	5%
Iron	0.9 mg	7%

* Percent Daily Value (DV)

Grilled tuna with polenta

Grilled tuna

Ingredients (serves 2):

- 300 g of tuna (the bluefin tuna is the main species of tuna found in the Adriatic Sea)
- 1 tablespoon of extra virgin olive oil
- 1 teaspoon of fresh lemon juice
- 1/2 teaspoon of salt
- 1 teaspoon of fresh rosemary leaves or 1/2 teaspoon of dried rosemary

Preparation:

Cut the fish into 2 pieces of the same size, if you have not already purchased 2 tuna steaks of approximately the same size. Add olive oil, lemon juice, salt and rosemary to a bowl and whisk to combine. Brush the fish with this mixture. Put the fish on the grill or put it in a grill pan. Grill over medium heat (4 – 6 minutes per centimetre of fish steak thickness) and brush occasionally with the marinade.

Polenta with olive oil

Ingredients (serves 2):

- 2 cups of water
- 60 g of cornmeal
- 1 teaspoon of extra virgin olive oil
- salt

Preparation:

Slowly pour the cornmeal into the boiling salted water while stirring continuously. Cook the polenta over medium heat for about 30 minutes until it turns into a uniform thick mixture. Serve with a drizzle of olive oil.

Grilled tuna with polenta

Nutrition facts

Per serving		% DV*
Calories	1678.6 kJ / 400.9 kcal	20%
Total fat	17.1 g	24%
Saturated fat	3.3 g	16%
Monounsaturated fats	9.1 g	
Polyunsaturated fats	3.4 g	
Carbohydrates	22.6 g	
Sugars	0.5 g	
Starch	20.1 g	
Dietary fibre	1.5 g	
Protein	37.2 g	74%
Salt	1.4 g	23%
Vitamin C	1.5 mg	2%
Vitamin A	988.8 µg	247%
Calcium	132.8 mg	17%
Iron	13.4 mg	95%

* Percent Daily Value (DV)

LUNCH OR DINNER IDEAS

Quinoa with chicken, courgettes and baby spinach

Ingredients (serves 2):

- 1/2 cup of quinoa (85 g)
- 1 tablespoon of olive oil
- 1 medium-sized courgette
- a handful of baby spinach
- 200 g of chicken fillet
- salt
- a bit of chicken stock
- herbs of choice

Preparation:

Rinse the quinoa, put it in the pot and pour a full cup of water over it. While the quinoa is cooking, fry the courgettes chopped into rounds on 1 tablespoon of olive oil. After 5 minutes, add the diced chicken, that you have salted beforehand, into the pan. Add a bit of chicken stock or water and let it simmer over medium heat. Finally, add spinach into the pan, and let it wilt. Add more salt, if needed. When the quinoa is cooked, add 1 tablespoon of olive oil. When the courgettes and chicken are ready (20 – 30 minutes), add cooked quinoa to the pan and add your spices of choice. This can be served both hot and cold.



Quinoa with chicken, courgettes and baby spinach

Nutrition facts

For 1 person		% DV*
Calories	1685.4 kJ / 402.6 kcal	20%
Total fat	14.1 g	20%
Saturated fat	2.6 g	13%
Monounsaturated fats	7.2 g	
Polyunsaturated fats	3.2 g	
Carbohydrates	25.8 g	
Sugars	4.1 g	
Starch	22.2 g	
Dietary fibre	3.9 g	
Protein	38.1 g	76%
Salt	0.2 g	4%
Vitamin C	14.8 mg	18%
Vitamin A	468.3 µg	117%
Calcium	59.3 mg	7%
Iron	3.7 mg	26%

* Percent Daily Value (DV)

LUNCH OR DINNER IDEAS

Chicken stir fry with rice noodles

Ingredients (serves 4):

- 400 g of chicken
- 2 medium courgettes
- 2 carrots
- 1 leek (if it is well tolerated)
- a handful of baby spinach
- a bit of fresh ginger
- 2 tablespoons of sesame oil
- 4 tablespoons of soy sauce
- 1 teaspoon of brown sugar
- 2 teaspoons of corn starch
- rice noodles, 400 g

Preparation:

Add soy sauce, corn starch and brown sugar to a small bowl and whisk to combine. Leave it to the side. Cook rice noodles as instructed on the package. Dice the chicken and cut the leek, carrots and courgettes into little sticks. Wash the spinach. Preheat the wok, and add sesame oil followed by leek, and shortly after, chicken. Add the carrots and courgettes. Cook shortly, over high heat. Add the sauce that you have prepared at the beginning and stir until it thickens. Finally, add spinach into the pan, and let it wilt. Serve with rice noodles.

Chicken stir fry with rice noodles

Nutrition facts

For 1 person		% DV*
Calories	1024.3 kJ / 483.5 kcal	24%
Total fat	13.3 g	19%
Saturated fat	2.7 g	14%
Monounsaturated fats	4.7 g	
Polyunsaturated fats	4.3 g	
Carbohydrates	41.8 g	
Sugars	13.9 g	
Starch	26.2 g	
Dietary fibre	4.1 g	
Protein	44.3 g	89%
Salt	2.6 g	44%
Vitamin C	29.4 mg	37%
Vitamin A	2691.2 µg	672%
Calcium	94.1 mg	12%
Iron	3.4 mg	24%

* Percent Daily Value (DV)







LUNCH OR DINNER IDEAS

Buckwheat risotto with roasted beetroot

Ingredients (serves 2):

- 120 g of buckwheat
- 300 g of beetroot
- extra virgin olive oil
- salt and spices of choice (e.g., thyme)

Preparation:

Wash and peel the beetroot and dice it. Put it in the oven to roast for approximately 20 minutes at 200 °C. Cook the buckwheat in salted water for 10 minutes until it softens. Purée one part of roasted beetroot with an immersion blender and mix it with buckwheat and dice the rest of the beetroot and add it into the buckwheat risotto. Drizzle with olive oil and add roasted mushrooms (optional).

Buckwheat risotto with roasted beetroot

Nutrition facts

For 1 person		% DV*
Calories	1394.3 kJ / 333 kcal	17%
Total fat	8.7 g	12%
Saturated fat	1.3 g	7%
Monounsaturated fats	5.5 g	
Polyunsaturated fats	1.3 g	
Carbohydrates	49.1 g	
Sugars	11.3 g	
Starch	38.4 g	
Dietary fibre	10.5 g	
Protein	9.5 g	19%
Salt	1 g	17%
Vitamin C	7.6 mg	9%
Vitamin A	20 µg	5%
Calcium	43 mg	5%
Iron	3.3 mg	23%

* Percent Daily Value (DV)

DESSERTS

Tapioca pudding

Ingredients (serves 1):

- 20 g of granulated tapioca
- 100 mL of rice milk
- 1 tablespoon of maple syrup
- 1 handful of fresh blueberries

Preparation:

Soak the tapioca pearls in a bit of rice milk for about an hour. Add the rest of the rice milk, soaked tapioca pearls and maple syrup into a pot. Let the mixture cook for 10 – 15 minutes until the pudding thickens. Pour the pudding into dessert bowls, wait until it thickens and add blueberries.



Tapioca pudding

Nutrition facts

Per serving		% DV*
Calories	944.4 kJ / 225.6 kcal	11%
Total fat	1.3 g	2%
Saturated fat	0.1 g	1%
Monounsaturated fats	0.7 g	
Polyunsaturated fats	0.3 g	
Carbohydrates	50 g	
Sugars	24.5 g	
Starch	17.7 g	
Dietary fibre	4.9 g	
Protein	2 g	4%
Salt	0.1 g	1%
Vitamin C	14.4 mg	18%
Vitamin A	86.6 µg	22%
Calcium	144.6 mg	18%
Iron	0.9 mg	6%

* Percent Daily Value (DV)

DESSERTS

Carob and banana pudding

Ingredients:

- 1 banana
- 1/2 tablespoon of carob powder
- 2 tablespoons of freshly squeezed orange juice*
- 6 chopped almonds
- 1 tablespoon of coconut oil

Preparation:

Mash the banana into a purée and add in the other ingredients while mixing. Top with chopped almonds.

* natural apple juice can be used instead of citrus juice

Carob and banana pudding

Nutrition facts

Per serving		% DV*
Calories	1311.6 kJ / 313.3 kcal	16%
Total fat	18 g	26%
Saturated fat	11.7 g	59%
Monounsaturated fats	3.5 g	
Polyunsaturated fats	1.3 g	
Carbohydrates	33.9 g	
Sugars	22.5 g	
Starch	7.4 g	
Dietary fibre	7.1 g	
Protein	3.5 g	7%
Salt	0 g	0%
Vitamin C	12.5 mg	16%
Vitamin A	26.7 µg	7%
Calcium	51.7 mg	6%
Iron	0.9 mg	6%

* Percent Daily Value (DV)



DESSERTS

Oat milk rice pudding

Ingredients:

- 60 g of short-grain rice
- 2 cups of oat milk
- 1 tablespoon of brown sugar or agave syrup
- berries of choice (e.g., raspberries)

Preparation:

Add oat milk into the pot and bring it to a boil. When it boils, add rice. Simmer over low heat until the rice absorbs the oat milk. When the rice is cooked, add sugar or syrup into the mixture. Serve with berries of choice.

Oat milk rice pudding

Nutrition facts

Per serving		% DV*
Calories	1603.8 kJ / 383.1 kcal	19%
Total fat	3.1 g	4%
Saturated fat	0.5 g	2%
Monounsaturated fats	0.8 g	
Polyunsaturated fats	1.1 g	
Carbohydrates	72.8 g	
Sugars	17.4 g	
Starch	47.6 g	
Dietary fibre	8.1 g	
Protein	8.7 g	17%
Salt	0.3 g	5%
Vitamin C	19.7 mg	25%
Vitamin A	166.1 µg	41%
Calcium	327.6 mg	41%
Iron	3.7 mg	26%

* Percent Daily Value (DV)





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