Results We performed 606 ileocolonoscopies in the above mentioned period due to suspicion of chronic inflammatory bowel disease or a bleeding polyp, and *E. vermicularis* was identified macroscopically in 10 patients (1.65%), of which 7/10 boys (70%). At the time of diagnosis, the median age was 10.99 years (3–17.5), and the median BMI was 18.62 kg/m² (13–22.06). Five patients (50%) were referred for diagnostic processing due to chronic inflammatory bowel disease suspicion, and five patients (56%) due to haematochezia and suspected bleeding polyp. The patients presented with various complaints of which: abdominal pain 4/10 (40%); blood in stool 6/10 (60%); diarrhea 3/10 (30%); and significant weight loss and perianal abscess in one patient. All patients had normal inflammatory parameters (CRP <2.8) and normal hemoglobin values for age (Hb 116–142). The mean duration of symptoms was 6.3 months (0.25 – 18). Parasite analysis of stool was performed in 4 patients (40%) and was negative in all, and perianal impression with adhesive cellophane tape was performed in only one patient, also negative. In all patients, *E. vermicularis* was confirmed macroscopically. In one patient, vulnerable mucosa reminding of ulcerative colitis (UC) was found along with enterobiasis, and in one patient we found non-specific terminal ileitis. Eosinophilia was found in four patients in intestinal biopsy samples. Following anthelmintic therapy with mebendazole, there was no recurrence of pinworm. One patient was later diagnosed with UC in the follow-up.

Conclusion *Enterobius vermicularis* is generally considered an innocent parasite, which in most cases causes perianal pruritus, and although it matures and lives in the intestines, severe gastrointestinal symptoms have rarely been reported. *E. vermicularis* infestation should be considered in patients with hematochezia, the screening of choice is perianal impression with cellophane tape, and the choice of treatment is mebendazole.

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ASSESSMENT OF NUTRITIONAL STATUS OF CHILDREN WITH A NEWLY DIAGNOSED COELIAC DISEASE – A 10-YEAR TERTIARY CENTRE EXPERIENCE

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Introduction and Aims Coeliac disease is an immune-mediated systemic disease caused by gluten consumption that occurs in children and adults with a hereditary predisposition. The clinical features of the disease are diverse, and the most common symptoms in children are chronic diarrhoea, failure to thrive, vomiting, abdominal pain and chronic constipation. In some children, if cases when there is increased risk for coeliac disease despite the absence of symptoms and signs of the disease, targeted serological screening can be undertaken. The aim of the study was to assess and compare the nutritional status in symptomatic patients and children in whom the diagnosis of coeliac disease was made based on screening.

Methods This was a single-centre, retrospective, observational study involving all children diagnosed with coeliac disease at the Referral Centre for Paediatric Gastroenterology and Nutrition, at Children's Hospital Zagreb, in the period from 1 January 2010 to 1 January 2020. Nutritional status data were obtained from a systematic review of patients' electronic data.

Results During the study period, coeliac disease was diagnosed in 166 children (70 boys, mean age 7.47 years, age range 6 months to 17.5 years). In 28 children (16.37%) the disease was detected by screening. Data on body weight (BW), body height (BH) and body mass index (BMI) were recorded at the time of diagnosis in 137 children (82.5%) and based on the available data, Z-scores corrected for age and sex were determined for BW, BH and BMI for age and sex. The mean BW Z-score was -0.40 (-0.47 in symptomatic children vs -0.05 in children identified by screening, $p < 0.05$), the Z-score was <-2.00 in 17 children (12.41%) children. The mean BH Z-score was 0.17 (0.13 in symptomatic children vs 0.04 in children identified by screening, $p > 0.05$), a delay in linear growth (Z-score <-2.00) was noted in two children. The mean BMI Z-score was -0.60 (-0.67 in symptomatic vs -0.23 in children identified by screening, $p < 0.05$). The BMI Z-score was <-2.00 in 22 children (16.05%), of whom only two were children in whom coeliac disease was detected by screening. Only one child, with symptoms of the disease, was obese.

Conclusion At the time of diagnosis, BW and BMI of symptomatic children were significantly lower than in children with coeliac disease identified through screening, a total of 16.05% of children were malnourished. Normal linear growth was recorded in both groups. Most of the symptomatic children had normal nutritional status at the time of diagnosis, and the nutritional status in almost all children detected by screening was normal. In conclusion, normal nutritional status does not rule out the disease and should not deter a physician from conducting a targeted screening for coeliac disease.

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PLANNING OF GLUTEN FREE DIET USING NUTRITIONAL SYSTEMS BIOLOGY APPROACH

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Introduction Celiac disease is an autoimmune disease that occurs in people with genetic predisposition, where gluten ingestion causes damage to the small intestines. When people with celiac disease eat gluten (a protein found in wheat, rye and barley), their body has an immune response that attacks the small intestine resulting in damage to the villi in small intestine. When the villi get damaged, nutrients cannot be properly absorbed into the body. So it is very important to know what happens in the cells after introducing gluten into organism. Lately, it has been recognised that systems biology tools have potential to increase understanding of how nutrition influences metabolic pathways and homeostasis. In this work the effect of the diet of paediatric patients on the celiac disease immune response was analysed using nutritional system biology approach.

Materials and Methods Celiac disease immune response mathematical model was constructed and analysed using CellDesigner 4.0 (Systems Biology Institute (SBI), Tokyo, Japan). Analysed mathematical model in the form of ordinary differential equations describes processes that take place in two intestinal compartments (lumen and lamina propria) and incorporates 16 variables and 34 processes, which correspond to 34 reaction rates. The effect of the different concentrations of gluten daily intake between paediatric patients on the

antibodies level changes was analysed. Western diet consists of 10–20 grams of gluten per day and as 'safe' is considered anything under 10 mg per day what is an equivalent to 1/350 of a piece of bread. Atypical gluten-free diet will consist anywhere between 6 milligrams and 10 mg of gluten per day but 'gluten-free' diet is rarely 100% without gluten i.e. proteins of plant origin from oats, rye, barley and wheat.

Results Mathematical simulations of the celiac disease immune response showed the differences in antibodies levels changes depending on the amount of gluten consumed by paediatric patients. The profile of the antibodies levels decrease after of changing diet from gluten containing to gluten free was also presented.

Conclusions Application of the nutritional systems biology approach in diet planning ensures detail insight in metabolic process and simple control of the metabolic reaction influenced by nutrient intake.

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LIVER DISEASE IN PEDIATRIC PATIENTS TREATED AT THE CYSTIC FIBROSIS CENTRE OF THE UNIVERSITY HOSPITAL CENTRE ZAGREB

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Objective To describe the characteristics of patients with cystic fibrosis-associated liver disease (CFLD), a complication of cystic fibrosis (CF) that is often asymptomatic until an advanced stage.

Methods Retrospective analysis included patients aged 0-20 years followed in 2018. at the Cystic Fibrosis Centre of the University Hospital Centre Zagreb. CFLD1 was diagnosed if ≥ 2 of the following were present: hepatomegaly and/or splenomegaly, elevated transaminases or gamma-glutamyl transferase (GGT) 3 times during 12 months, ultrasound signs of liver involvement or portal hypertension (PTH), suggestive pathohistological findings. Severe CFLD was defined as a disease with signs of PTH.

Results 61 patients with a mean age of 10.9 years (9 months-19 years, male: female = 34:27) were included. 9/61 (14.8%) of them had CFLD, 6 girls and 3 boys, aged 2-19 years (average age 10.7 years). They all had at least one F508del mutation, and 7/9 were homozygous. Regarding the severity of the disease, 4 patients (3 boys and 1 girl, 6-19 years) had a severe form of CFLD with PTH and presumed cirrhosis, which was confirmed by liver biopsy in one patient. Two patients also had impaired synthetic liver function, two had hypersplenism with platelet count $< 80 \times 10^9/L$, and one had esophageal varices without bleeding. The remaining 5/9 patients had mild CFLD with ultrasound changes (hyperechoic or nodular liver parenchyma, periportal fibrosis) and/or elevated liver enzymes.

We observed a trend of poor nutritional status in patients with severe CFLD (mean BMI z-value -0.66, range -0.26 to 0.62) compared to those with mild form of CFLD (mean BMI z-value -0.41, range -2.76 to 1.49), but the difference wasn't significant, and the most severely malnourished patient had mild CFLD.

We also assessed some noninvasive biomarkers of fibrosis: the APRI index was elevated (≥ 0.5) in all patients with severe

CFLD and in one with mild CFLD, and Fibrosis-4 score was pathological in only one patient with PTH. Elastography was performed in 5 patients: it was normal in one patient with mild CFLD, whereas in four increased liver stiffness was found (significantly increased in two patients with severe CFLD, and mildly in two patients with mild CFLD).

4/9 patients with CFLD had meconium ileus, which is approximately twice the frequency compared to all included CF patients.

Conclusion The diversity of clinical expression and findings in our patients is consistent with the literature data on the spectrum of CFLD manifestations. We confirmed a higher incidence of meconium ileus and severe mutations, and male dominance in CFLD with PTH. In all CF patients, liver disease should be actively sought from an early age (clinical examination once a year + abdominal ultrasound + AST, ALT, GGT).

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TRANSCUTANEOUS NEUROMODULATION IN CHILDREN WITH CHRONIC INTRACTABLE CONSTIPATION

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Objective Transcutaneous neuromodulation is a therapeutic method using electrical stimulation on nerve fibers. It may be optional therapy in children and adults with chronic constipation. The goal was to evaluate the effectiveness of this method in children with chronic refractory constipation who had been treated with conventional pharmacological and bio-feedback therapy without complete improvement.

Methods 15 patients (8 boys and 7 girls), with median age of 9.03 ± 2.98 years and diagnosis of intractable chronic functional constipation were assigned for neuromodulation. They had been previously treated conservatively following ESPGHAN guidelines, for the median period of 37 months (7-66 months) without achieving complete stool regulation. Biofeedback therapy had also been performed in 11 patients. Neuromodulation was added as an additional treatment, without removing previous therapy. Transcutaneous sacral (TSNS) or tibial (TTNS) nerve stimulation was performed at home, every day for 20 minutes, during the period of 2 to 3 months. Self-adhesive surface electrode was placed at sacral S2-S3 for TSNS and 4-5 cm cranial from medial malleolus for TTNS. The usefulness of this method was evaluated according to 3 parameters: the frequency of spontaneous defecation, the improvement of sensation for defecation, and reduction of rectal dimensions (followed by ultrasound before and after neuromodulation).

Results Data of 15 patients was analyzed. TSNS was performed in 13 (86.7%), and TTNS in 2 (13.3%) children. Positive effects were noticed in 9 (60%) children for all of 3 parameters.

Monitoring each parameter separately, a better dynamic of spontaneous defecation was achieved in 10 (66.7%) children, improving of sensation in 9 (60.0%) children, and decreasing of rectal diameter in 10 children, from the 11 that underwent an ultrasound (90.9%). Rectal diameter reduced from initially 4.98 ± 1.24 cm to 3.80 ± 1.15 cm, on average 1.18 ± 0.91 cm, which was statistically significant ($p=0.024$). Every patient achieved improvement, on at least one of the parameters. 10