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**Wybrane czynniki predykcyjne w ocenie prawdopodobieństwa
rozpoznania oraz ciężkiego przebiegu zakażenia SARS-CoV-2
z uwzględnieniem zaburzeń węchu**

**Rozprawa na stopień doktora nauk medycznych i nauk o zdrowiu
w dyscyplinie nauki medyczne**

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III. STRESZCZENIE W JĘZYKU ANGIELSKIM

Selected predictive factors in the evaluation of the risk of SARS-CoV-2 positivity and severity of COVID-19, with emphasis on olfactory disorders

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). SARS-CoV-2 infection may be asymptomatic or symptomatic, with the course of the disease varying widely from mild to severe to critical, and can possibly be fatal.

The objectives of the presented studies were to identify the risk factors for SARS-CoV-2 infection, with particular emphasis on the evaluation of the predictive value of olfactory disorders using an olfactory screening test developed for this study, to summarize the current knowledge on the pathogenesis of COVID-19-related anosmia, and to identify the risk factors for severe COVID-19, including the causative SARS-CoV-2 variant, as well as the role of demographic, clinical and laboratory factors in predicting severe course of disease in the populations of young adults and pregnant women hospitalized for COVID-19.

The study of the prevalence of olfactory disorders in COVID-19 patients and their predictive value in assessing the likelihood of SARS-CoV-2 infection included 64 hospitalized COVID-19 patients and 34 healthy volunteers who completed a questionnaire on demographic data, medical history, course of disease and self-reported olfactory disorders, and underwent psychophysical olfactory assessment using a simple disposable odor identification test (SDOIT) developed for this study. The diagnostic utility of self-reported olfactory disorders and psychophysical test results was assessed using ROC analysis. Moreover, in order to summarize the current knowledge on the pathogenesis of olfactory disorders in the course of COVID-19, a review of the current literature on the subject was conducted. To assess predictors of severe disease in young adults, including the impact of the SARS-CoV-2 causative variant, a single-center, retrospective study of 229 patients hospitalized for COVID-19, aged 18 to 45 years, was conducted, including 75 patients hospitalized during the second wave and 154 patients hospitalized during the third wave of the pandemic. In order to assess prognostic factors, the severity of the disease course between two waves of the pandemic was compared, and the impact of demographic, clinical and laboratory factors on the severity of the disease was evaluated. Moreover, models for the prediction of death, the need for mechanical ventilation and admission to

the intensive care unit were also created using multivariate logistic regression. To evaluate prognostic factors in COVID-19 in the population of pregnant women, a single-center, retrospective study of 52 pregnant patients with confirmed SARS-CoV-2 infection was conducted, and the influence of demographic characteristics, clinical data and laboratory abnormalities on disease severity was assessed.

Anosmia in the course of SARS-CoV-2 infection is probably mainly due to the damage to the olfactory epithelium, to which this virus has a high affinity. Therefore, the occurrence of olfactory disorders in the course of COVID-19 is frequent, and may be a good predictor of infection. The results indicate that self-assessment of smell in COVID-19 tends to underestimate the prevalence of anosmia, highlighting the importance of psychophysical methods of evaluating the sense of smell. The newly designed psychophysical test (SDOIT), especially in combination with self-reported symptoms, may be useful in screening for SARS-CoV-2 infection, allowing for early isolation of patients and referral for further diagnostic tests. There was no association of the self-reported olfactory disorders with the severity of COVID-19. The SARS-CoV-2 alpha variant is unlikely to cause a more severe disease course than the previous variants. Risk factors for poor prognosis in hospitalized young adults include obesity, comorbidities, a history of smoking, higher percentage of lung involvement on computed tomography (CT), lower peripheral oxygen saturation (SpO₂), leukocytosis, neutrophilia, lymphopenia, higher immature granulocyte count, higher neutrophil-to-lymphocyte ratio (NLR), higher concentrations of C-reactive protein (CRP), procalcitonin (PCT), interleukin-6 (IL-6), D-Dimer, lactate dehydrogenase (LDH), high-sensitive troponin I (hs-TnI), creatine kinase-myocardial band (CK-MB), myoglobin, N-terminal-pro-B-type natriuretic peptide (NT-proBNP), creatinine, urea and gamma-glutamyl transferase (GGT), lower estimated glomerular filtration rate (EGFR), and lower concentrations of albumin, calcium and vitamin D₃, as well as possibly a decrease in erythrocyte count, hemoglobin concentration and hematocrit level and an increase in creatine kinase (CK) activity. In pregnant patients, potential predictors of severe COVID-19 include comorbidities such as hypertension and diabetes, a higher percentage of lung involvement on CT, and a number of laboratory abnormalities such as lymphopenia, hypocalcemia, hypoproteinemia, low total cholesterol, and elevated concentrations of CRP, PCT, IL-6, ferritin, LDH, hs-TnI and glucose. Identification of poor prognostic factors in specific subpopulations may allow for early identification of patients at high risk for severe COVID-19, allowing for the application of an appropriate management strategy in these cases and contributing to a better prognosis.