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Jagoda Jóźwik-Pruska M.Sc.

Lodz University of Technology

Faculty of Chemistry

Institute of General and Ecological Chemistry

Supervisor: Joanna Kałużna-Czaplińska, PhD., D.Sc.

„The determination of selected metabolites in the urine of autistic children with the application of chromatographic methods”

The doctoral dissertation is devoted to the determination of the levels of metabolites: β -casomorphine, 6-methoxyharmalan, and tryptophan in the urine of autistic children with the application of chromatographic techniques. The main purpose of the research was to develop analytical procedures enabling qualification and quantification of these compounds. Studies have been supported by multidimensional statistical analysis, which made it possible to determine the effect of supplementation on the levels of selected metabolites. The research was performed in close collaboration with a dedicated team of physicians, therapists and parents of autistic patients from the Autism Diagnostics and Therapy Center NAVICULA. During the doctoral dissertation, the following issues were implemented:

- an analytical procedure which allows the determination of β -casomorphine in urine was developed and validated;
- an analytical procedure which allows the determination of 6-methoxyharmalan in urine was developed and validated;
- concentrations of β -casomorphine, 6-methoxyharmalan and tryptophan in urine samples of patients with autism were determined with the use of chromatographic techniques (HPLC-UV / Vis, HPLC-DAD, GC-MS);
- basic parameters of urine in the tested samples were determined;
- with the support of multivariate statistical analysis, the following tasks were verified: a) the influence of supplementation on the levels of the determined compounds; B) the correlation between the concentration of the compounds and the body mass index (BMI), age and gender of patients;

The paper attempts to verify the opioid excess theory in autism. Based on the obtained results, the assumption that the presence of these compounds was a direct cause of ASD development may be dismissed. In addition, there was no relationship between the presence and the concentration of β -casomorphine and the supplementation, BMI, age and gender of patients.

The monitoring of tryptophan levels in the study population of autistic individuals indicated an abnormal metabolism of this amino acid in subjects affected with this disorder. There was a positive effect of supplementation with vitamins B and magnesium on the concentration of this compound.

In the majority of samples from children with autism, the presence of 6-methoxyharmalan, a hallucinogenic compound, was identified. At the same time its presence was not reported in healthy volunteers. The obtained results allow us to postulate the importance of serotonin pathway abnormalities in the etiology of autism, thus contributing to further research in this field.

The presented doctoral dissertation demonstrates the relevance of the use of chromatographic techniques in autism research. The results obtained in the experiment allow the doctors cooperating with the NAVICULA Center in Lodz to undertake appropriate dietary and pharmacological interventions. Regulation of metabolite concentrations to normal levels in the body of patients with ASD may result in their better functioning.

Jagoda Joćimk-Ponśka