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MULTINUCLEAR NMR SPECTROSCOPY OF AZO DYES: NMR METABOLOMICS STUDY OF THE ASSOCIATION BETWEEN PANCREATIC CANCER AND DIABETES MELLITUS

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Pancreatic cancer (PC) is considered one of five most lethal cancer types, with a globally reported incidence increase [1]. Local symptoms, such as pain, jaundice, cachexia or cholangitis, appear late. Early symptomatology, including weakness, nausea, abdominal pain or unexplained weight loss, is not specific and may have many other causes [2]. Therefore, there is currently no reliable early-stage diagnosis. Unfortunately, the prognosis is highly unfavourable, 95–97% patients would not survive more than 5-years. Consequently, the search for early symptoms and specific biomarkers of PC remains a subject of intense research. A proper biomarker would open the possibility to suggest a screening program for PC early diagnosis, before late symptoms occur. Group of patients with pancreatogenic type 3 diabetes can benefit from proposed screening program. These patients can exhibit early symptoms 2-3 years before any local symptoms of cancer occur. That represent a large diagnostic window [3].

In our study, ^{1}H NMR metabolomics was employed to plasma samples of pancreatic cancer patients, individuals with long-term diabetes mellitus type 2 (lasting more than 5 years) and healthy controls. The NMR analyses were followed by establishing a statistical model based on principal component analysis and discriminant analysis. The aim was to discover differences between these groups and to define a potential biomarker panel. The statistical evaluation of metabolomics-based profiles provided high values of sensitivity and specificity. Subsequently, plasma samples of the risk group, specifically patients with recently diagnosed diabetes mellitus with a duration of <3 years (possible T3cDM), were analysed and the possibility of PC development was predicted. The achieved results showed strong potential of ^{1}H NMR metabolomics to establish a biomarker panel that would facilitate the early diagnosis of PC and the possibility identify diabetic individuals, who are at risk of developing PC.

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References

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