DSC as a diagnostic tool in the medical applications

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This presentation discusses the thermal changes of human blood plasma components in melanoma malignum (MM) patients with or without regional lymph node metastases, in female breast cancer, in different stage psoriatic disease as well as in pancreatic malignancies by DSC. Overview a lot of patients' thermograms, we observed their individual characteristics compare to healthy controls. Similar observations have been described by Garbett et al. who demonstrated average thermograms for individuals diagnosed with various inflammatory diseases (Lyme disease, rheumatoid arthritis) and cancers (endometrial, ovarian, lung) etc.. These data suggest that each type of disease may have a characteristic signature in their thermogram [1-3]. Another pioneer works were performed by group of Michnik [4-6] and Todinova [7,8]. DSC studies of plasma or tissues indicate that this technique can be applied to pathomorphological cases or diseases detection and monitoring. The results of healthy persons and patients with various diseases have revealed the differences between the shape of plasma DSC curves and between the thermodynamic parameters of denaturation transition. Up till now, there are no generally accepted laboratory markers to assess effectiveness of different therapeutic methods or to follow up patients with different malignus alterations. Moreover, in a clinical practice there are no laboratory findings specific for psoriasis.

In case of MM patients the second T_ms and the calorimetric enthalpy changes demonstrated a significant difference of the melanoma depth dependence in 0.95-8 mm range and in Clark levels of II-IV. In case of patients with breast cancer we have observed a trend between the thermal parameters of denatured samples and the number of affected lymph nodes. The calorimetric enthalpy exhibited also a trend of the sickness, but because of the low number of patients we can not take it to be significant.

The average melting temperature in case of samples with no treated sporiasis was around 63 ºC, the calorimetric enthalpy was in the range which is usual in case of this kind of biological materials ($\Delta H \sim 1.25$ J/g). The thermal denaturation of blood plasma of patients with different stages of pancreatic tumor exhibited a severe of disease dependence. The main denaturation temperature increased from 62 to 66 °C and the calorimetric enthalpy was the highest in case of patients with malignant but operable tumour. It seems that by DSC analysis of human plasma we could separate benign pancreatic disease, localized and systemic pancreatic malignancies from each other.

Blood collection is a simple procedure and convenient to perform, and the DSC thermogram confirmed unique signature for human plasma components reflecting the normal, the pathomorphological changes and staging differences in different diseases. Further studies are needed to elucidate these relationships, but this study indicates great potential for the application of DSC as a clinical diagnostic tool, for example during disease grading and staging processes.

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