

Examination of the cyclophosphamide induced polyneuropathy on Guinea pig sciatic nerve and gastrocnemius muscle with differential scanning calorimetry

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Background: Polyneuropathy is defined as a simultaneous malfunction of several peripheral nerves, which could be a side effect of cancer therapy; however, this is reported to occur rarely and difficult to prove. Aims: The purpose of the study was to introduce at the first time the calorimetry in the diagnosis of neuropathy in an experimental animal model. The study was inspired by the forensic investigation of a 53 years old cancer survival female patient, in whose case the development of polyneuropathy could have been caused by cyclophosphamide therapy.

Materials and Methods: Adult guinea pigs were injected intraperitoneally with the dose of cyclophosphamide that comparable to the human dosage. Animals were euthanized; nerve and muscle samples were analyzed by a SETARAM Micro calorimeter. The denaturation temperatures were measured and the calorimetric enthalpies were calculated based on the areas under thermal absorption curves.

Results: the thermal denaturation of the samples decreased and the calorimetric enthalpy increased, depending on the therapeutic cyclophosphamide doses. The nerves were more sensitive to chemotherapy, compared to the muscles.

Conclusion: The toxic effects of cyclophosphamide on peripheral nerves and muscles can be measured and analyzed by calorimetry, which effects were found dose dependent.