Summary of the doctoral thesis by MSc Klaudia Pawlina, titled: "Characteristics of the mutations of equine sarcoid cancer cells". Thesis promoter: prof. dr hab. Monika Bugno-Poniewierska.

Equine sarcoids are the most common neoplasms occuring in horses. The bovine papillomavirus (BPV) is believed to play a major role in their pathogenesis. Despite frequent occurrence, this tumour is still not well characterized, especially at the molecular level.

In the present studies, the identification of copy number variation (CNV) present in the genomic DNA of sarcoid cells was carried out. The results showed an increased number of copy number variants as well as cnLOH (copy neutral Loss of Heterozygosity) in the tumor samples compared to the healthy tissue. It may suggest the increased instability of the genetic material in the course of sarcoid neoplastic transformation. The analyzed samples were characterized by a great diversity in terms of the identified aberrations, suggesting the possibility of the existence of different mechanisms leading to the formation of this cancer. Functional analysis of genes located within the identified aberrations showed the presence of numerous genes encoding microRNAs and associated with oncogenesis of different types of human tumours.

Due to the high number of microRNA coding genes among genes subjected to copy number variation, the expression profile of these RNAs in the sarcoid and healthy tissues was also determined. As a result, both known and potentially novel miRNAs were identified. Differential expression analysis revealed the existence of more than one hundred miRNAs being over- or underexpressed in the sarcoid tissue in comparison to the healthy tissue. Among the miRNAs undergoing the differential expression, microRNAs associated with neoplastic transformation in many other types of cancer were identified. These results indicate a potentially large share of microRNAs in the course of tumorigenesis of equine sarcoids and may suggest the existence of mechanisms common to different types of tumors, irrespective of species features.

Summarizing, equine sarcoid cancer cells are characterized by increased genomic instability and changes in the profile of microRNAs in comparison to healthy tissue. Alterations taking place in sarcoids at the molecular level bear a certain resemblance to those observed in other types of cancer and involve a number of known oncogenes. This suggests the existence of certain common and species-independent elements of neoplastic transformation.