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About 1100 to 1200 patients under the age of 14 years old are being diagnosed with cancer in Poland every year. Despite relatively small incidence of childhood cancers, compared with adult patients, cancer is the leading cause of dead from diseases in children. Although prognosis in paediatric brain tumours has improved over many years still high proportion of children is currently incurable. We focus analyses on aggressive brain tumours since they are the most challenging tumours in clinical practise. In the era of advances in cancer research, diagnosis and risk stratification disappointingly remains to date clinical, including such factors like presence of metastases or age of patient, and histopathological based on image of cancer tissue under microscope.

Therefore, the objective of the proposed project is an introduction of novel classification based on analysis of cancer cells processes reflected by level of function of many genes.

Our investigation will be based on new technology, NanoString nCounter® Analysis System, not applied in Poland so far. Importantly, it is possible to analyse tumour material fixed in formalin what in consequences causes degradation of element called RNA which reflects function of the genes. Therefore formalin-fixed material, which is routinely preserved in hospital practice, will be suitable for modern novel diagnostics.

As a final result we aim to design and validate multi-genes signature which can be applied for future diagnostic and prognostic purposes.

Also analysis of genetic material DNA will be performed for detection of abnormalities called tumour specific mutations.

The results of our work will have an impact on:

1) improvement in diagnosis and identification subtypes of tumours, which are not detectable using current approaches,

2) prognostic usefulness with the aim to identify patients who require new therapeutic
schemes to avoid under or over treatment

3) identification of patients who may benefit from new biological drugs

We also foresee great diagnostic potential arising from our project not only in paediatric oncology since our approach can be introduced into diagnosis of adult cancer patients in the future.