Due to growing anthropogenic pressure, a wide variety of toxic contaminants are entering marine environments not only in the Baltic Sea, but also worldwide. They interact with living organisms and are often responsible for destabilization of their function, including alterations in their physiology, morphology and behavior and subsequently provide a threat to the health of social, ecological and economic systems interacting with the sea. As the level of water toxicity increases, there is also an increase in the frequency of various pathologies in marine organisms including leukemia-like neoplasia occurring in marine molluscs. This tumor was also found in the Baltic clam *Limecola balthica* (former *Macoma balthica*) inhabiting various and often polluted areas of the Gulf of Gdansk as well as in the blue mussels *Mytilus trossulus* and soft-shell clam *Mya arenaria*. The etiology of neoplasia has not yet been established, however, several hypotheses were proposed to explain its origin. These include the involvement of environmental contamination, but also a role of the viral agent. One of the most recent hypotheses explaining the origin of neoplasia in marine mollusks was described in magazines such as "Nature", "PNAS" and "Cell", and include horizontal transfer of cancer cells between individuals of the same species and between different species. More precisely, hemocyte-based neoplasia in bivalve mollusks was classified as an infectious disease, with cancer cells being directly released into the marine environment and taken by other individuals directly from the ambient environment during basic vital functions. The mechanism that led to evolving of infectious form of cancer is not yet understood; presumably, the involvement of retrotransposon element leads to genomic instability of bivalves. Additionally to that, a number of pollutants present in the ambient environment are known for altering the immune response of these invertebrates hence making them more susceptible to this type of "infection".

The purpose of this project is to determine the etiology of infectious neoplasia by investigation of contagious cancers spread within the same species and between different bivalve species, namely the Baltic clam, blue mussels and soft-shell clam inhabiting the Gulf of Gdańsk. Indeed, despite the accumulation of evidence on the role of pollution in this disease, recent studies suggest that the transmission of independent cancer lineages between animals does occur in marine environments and may be more widespread than previously thought. Material for the study will be sampled from areas varying in neoplasia frequency selected based on previous research. The disease will be diagnosed using histology and flow cytometry techniques. Our study will be conducted using *in vitro* and *in vivo* approaches. Flow cytometry based separation of neoplastic and non-neoplastic cell lines from different species displaying neoplastic abnormalities will allow for discrimination between different cancer cell line(s). Comparison at a genetic level between previously determined neoplastic cells line(s) will allow finding whether cancers in the Gulf of Gdańsk bivalves are due to intraspecies transmission of clones or to the generally rare interspecies transmission. Bivalve hemocytes and cancer cells will be studied using primary cells culture with genetic, immunological and biochemical analysis carried out on selected material. Obtained material will also be used as "infectious agent" in inoculation experiments in which cancer cells will be administered to healthy individuals through co-habitation and / or direct infection. This approach will allow evaluating the effectiveness of horizontal transmission of neoplastic cells and cancer pathogenicity under laboratory conditions. Determination of tumor propagation vectors in marine environment and its effect on the ability to produce vital gametes will involve events such as spawning during which ploidy level analyses of cells ejaculated into water will be performed. The obtained results will help to understand the role of cancer infectivity and pollution in the etiology of neoplasia occurring in Baltic bivalves.