Background Immunotherapies have managed to cover the needs of cancer patients that traditional therapies could not treat. Despite the improvement, broadly acting and highly effective therapies capable of eliminating human cancers without mutated antigens still need to be developed. In this regard, virus-like-vaccine (VLV) technology together with the selection of a cancer specific but ubiquitous antigen can be the key to a successful immunotherapy. VLVs combine the benefits of adenoviral vectors and virus-like-particles (VLPs), leading to the activation of both B- and T-cell responses. Human endogenous retroviruses (HERV) are remnants of ancient viral infections that got integrated into our genome millions of years ago, comprising now the 8% of it. HERVs are usually silenced in healthy tissues but are overexpressed in various cancer types, making them good antigen candidates. HERV-K is the most widely studied HERV, and evidence of HERV-K expression is particularly strong in breast cancer. There are currently no curative therapies for advanced breast cancer, thus our research has been focused on the putative effect of our cancer vaccine in advanced breast cancer.

Materials and Methods This project seeks to describe the effects of HERV-K specific humoral immunity on breast cancer progression. Expression of HERV-K protein in a wide range of breast cancer cell lines was initially investigated. We optimized proliferation, cell migration and invasion, and colony formation assays to explore the role of HERV-K in the phenotype of breast cancer cells. These are then subjected to treatment with commercial and in vivo generated antibodies against HERV-K, protease inhibitors, and agents that block putative HERV-K interaction partners.

Results HERV-K was shown to be present in a wide panel of breast cancer cell lines of various HR, ER, and HER2 status. The project is still ongoing, and I will be analyzing data with this cell lines over the next four months, showing the oncogenic phenotype of HERV-K. Additionally, I will be assessing the effect of our vaccine derived antibodies in tackling the immunosuppressive properties of HERV-K in T-cell and NK, as well as in the involvement of antigen presentation and T-cell activation.

Conclusions This project will reveal whether HERV-K is a valuable target for VLVs in advanced and recurrent breast cancer.

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