ZNF695 and ZNF714 – KRAB-ZFP factors shaping the epigenetic landscape of lung cancer cells.

Lung cancer is a worldwide threat associated with the healthcare burden and costs substantial on a global scale. It is the leading type of oncogenic disease occurring in men and the third most commonly occurring cancer in women. The treatment methods include surgery, radiotherapy and chemotherapy, but still, the five-year survival rate is very low. Our aim is to investigate a specific type of cancer cells that are believed to be a part of tumor mass, so-called cancer stem cells (CSCs). These unique cells may be the cause of cancer relapse and metastasis. Importantly, they share many features with physiological stem cells. The physiological stem can be found in an embryo as they are the basis of developing organism: they give rise to all specialized cells and tissues that build our body. Stem cells can also be found in adults in specific places in the body including bone marrow, adipose tissue, pancreas, liver or epidermis – these cells are called adult stem cells. It is believed that some cells from cancer mass can "hijack" stem cell-specific regulatory mechanisms and behave similarly to physiological stem cell. This means that they can divide almost infinitely, thus rebuilding cancer mass even after a course of treatment. What is more, they can give rise to cells that are needed for cancer invasion and metastasis. No wonder, that knowing the specific mechanisms that regulate cancer stem cell biology will be beneficial for developing more efficient cancer treatments. We know that some genes are abundantly present both in physiological stem cells and in lung cancer cells. Among these genes, there are members of KRAB-ZFP family (ZNF695 and ZNF714) that are essential for sustaining stemness features in physiological embryonic stem cells. We think that they can have an important role also in cancer cells, and knocking them down will be helpful for increasing treatment efficiency. Nowadays, we have plenty of advanced tools to investigate the role of specific genes in cancer cells very closely. With the advantage of genetic engineering we can modify lung cancer cells that are cultured *in vitro*, for example decrease the level of ZNF695 and ZNF714 genes. Then, we can isolate genetic material and investigate changes that happened after genes depletion using NGS (next-generation sequencing) technology. Based on the results we can get some more insights into the processes that are driven in a cancer cell by specific KRAB-ZFP factors. Hopefully, we will define mechanisms that are responsible for cancer stemness, aggressiveness and resistance to standard treatment. This can be a good start for developing new and more effective anticancer therapies.