Personalized Cancer Cell Weapons using CRISPR Genetic Engineering, Year Three

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Cancer cells have a homing ability and are able to track cells of their own kind. Because of this constant communication and close proximity, cancer cells could be used as targeted weapons that deliver treatments to impede their survival. CRISPR may be used to design a small population of genetically engineered cancer cells that could produce harmful agents to other circulating cancer cells. In designing the engineered cancer cells, IRF7 was activated using CRISPRa. IRF7 is commonly expressed on breast cancer cells and is involved in the production of Interferon 7, a protein observed to inhibit the growth of cancer cells. In order to establish the IRF7 activation, a modified dCas9-VPR cell line was created by transducing the dCas9 protein through lentiviral delivery. After the CRISPR engineered cells were produced, two control groups (MCF-7 and dCas9) and a CRISPR group were made. Neutral red was used to stain CRISPR cells to differentiate and monitor them. An MTT assay was utilized over four consecutive days to determine cell proliferation and viability. The CRISPR cells maintained interaction with the cancer cells in culture when observed under the microscope. Six days after the initial co-culture, the CRISPR group had statistically significant lowered growth rates compared with both control groups ($p < 0.05$). Additionally, the CRISPR group had the lowest total optical density counts for all the MTT days. There could be potential in using cancer cells as a targeted treatment approach in attacking the inner workings of cancer development.

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