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Selective migration of neuralized mouse embryonic stem cells towards tumor cells and conditioned media

Brain tumors are the most common cause of mortality from cancer in childhood. The limitations of current treatments of malignant brain tumors motivate development of novel therapies. The overall goal is to develop stem cell therapies to use as a treatment for malignant brain tumors. Neural stem cells migrate towards areas of damage and inflammation in the nervous system, as well as malignant brain tumors. Our project was to determine whether embryonic stem (ES) cells migrate towards different tumor cells or media conditioned by tumor cell lines. To date, we have obtained the following results. For undifferentiated ES cells, no differences were seen between migration patterns towards the various tumor cell lines, media conditioned by the tumor cell lines, or culture media alone (the control). As the ES cells became more differentiated (i.e., more like neural stem cells), fewer cells migrated across the membrane under all conditions. This suggests a decrease in motility by differentiated ES cells. However, by day 8 of the ES cells' differentiation process, significantly more differentiated ES cells migrated towards the tumor cells and media conditioned by the tumor cells, when compared to DMEM, the control, alone (Dunnet Test; $P < 0.01$ and $P < 0.05$, respectively). Even though there is a decrease in the motility of the stem cells, they are more specific towards the target. Presently, we are doing immunolabeling with nestin, beta-3-tubulin, GFAP, and TuJ1 to observe the fate of the ES cells as they undergo the differentiation process.