Biolistic Gene Delivery as a Potential Treatment for Skin Cancer

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When skin cancer metastasizes the survival rate drops to 23%, so targeting skin cancer before this happens is paramount. E4orf4 is a gene that allows viruses to regulate gene expression, in mammalian cells, it exhibits anti-cancer properties. Biolistics is a promising way to deliver genes to desired cells however, commercial biolistic apparatuses or “gene guns” cost upwards of $30,000. An apparatus was constructed that was able to use carbon dioxide pressure to accelerate DNA coated tungsten particles at a target. Plasmid DNA was isolated and tungsten was subsequently coated with the DNA. MEFs were used as a model for cancer due to their high regeneration rate and their dependence on the pathways that e4orf4 inhibits. Before the experiment was conducted, MEF cells were plated then exposed to UV lights and vinyl chloride to induce more cancerous characteristics. The biolistic apparatus was used to shoot the cells at 350psi with the tungsten coated DNA. Other trials involved shooting only tungsten, using DNA only, and a trial to serve as the control. A hemocytometer was used to count half of the cells while an MTT assay was used to count the other half. The results showed that the treatment with DNA coated tungsten particles had a reduction in viability of 68%. The tungsten alone slightly reduced the viability, by 18%. In both the control and DNA alone group, the viability was close to 100%. Biolistic gene transfer is a viable potential treatment for cancer.

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