Use of Adipose Derived Stem Cells in Head & Neck Reconstructive Surgery: Friend or Foe?.

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INTRODUCTION: Head and neck cancer is the sixth most common form of malignancy worldwide, accounting for over 400,000 new cases per year. Of these patients, 70% of them arrive with advanced disease. Following surgical resection and radiation, patients usually suffer from disfigurement of the head and neck region and become good candidates for reconstructive surgery. Autologous fat transplantation is one current option in the treatment of post-irradiation wounds. Abdominal fat tissues are harvested and injected into the affected area. These fat injections contain resident adipocyte derived stem cells (ADSC), which have been shown to improve and accelerate wound healing, tissue regeneration and cellular differentiation. However, the safety and efficacy of ADSC’s and their potential interaction with head and neck cancer is still unknown. The purpose of this study is to investigate the interaction between human ADSC’s and head and neck cancer cell lines, CAL-27, SCC-4 and SCC-25, all oral squamous cell carcinomas (OSCC).

METHODS: A wound healing assay was used to measure head and neck cancer cell migration in the presence of ADSC conditioned media (CM). 3.0 x 10⁵ CAL-27 head and neck cancer cells were cultured in 12-well dishes in DMEM and 10% fetal bovine serum and allowed to adhere for 24 hours. Cultures were incubated with CM at the follow percentages: 0%, 20%, or 50% CM following a ‘scratch’ wound and were cultured for an additional 6 hours. Photographs of the cultures were taken at times 0 and 6 hours, and analyzed using ImageJ (NIH, Bethesda, MD) to calculate percent gap closure. RESULTS: ADSC CM stimulated migration of CAL-27 OSCC cells: 14% gap closure in cells incubated with 20% CM (P < 0.05), and 18% gap closure in cells incubated with 50% CM (P< 0.01). CONCLUSIONS AND FUTURE DIRECTIONS: The results of these data demonstrate that ADSC CM stimulates migration of head and neck cancer cells. Further study is needed to determine whether fat transplantation will be safe in head and neck cancer patients following surgery and radiation therapy. Future directions include testing additional head and neck cancer cell line measuring growth, migration, and angiogenesis in vitro and in vivo.