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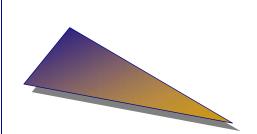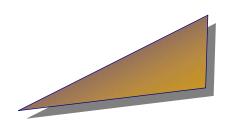
Biomedical Engineering

Lecture Series Seminar

Adult Stem Cell-based Craniofacial Tissue Engineering

Wednesday, May 14, 2008

3:00 PM
EC 2300

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Stem cell-based tissue engineering is a promising substitute of current clinical treatment for craniofacial reconstruction. Adult stem cells, such as bone marrow stem cells and adipose-derived stem cells, are considered potential cell sources for craniofacial tissue regeneration due to their self-renew and multiple differentiations. However, the adult stem cells have the limitations of insufficient supply and losing differentiation capacity following in vitro expansion. Furthermore, the properties of adult stem cells may vary on donors with different patho-physiological conditions. In order to regenerate craniofacial tissue by stem cells-based tissue engineering for clinical application purpose, it is essential to optimize and evaluate capacities of adult stem cells and stem cell-driven tissue-engineered constructs. In our studies, we revealed that human bone marrow stem cells and adipose stem cells possess multiple differentiation potentials for soft and hard tissue regeneration. Estrogen supplement potentially improves stem cell proliferation and differentiation, and inhibits stem cell senescence. These results indicate that estrogen can play an important role in optimizing adult stem cells for craniofacial tissue engineering. In addition, our studies found that magnetic resonance image can provide vital information of tissue-engineered constructs and serve as a non-invasive monitor for stem cell-based tissue regeneration.