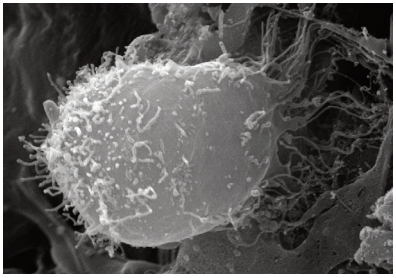
RESEARCH UPDATE 2

Ongoing and recent projects funded by Grayson-Jockey Club Research Foundation

Dr. Mandi J. Lopez describes her project on Equine Tissue Regeneration With Adult Stem Cells at Louisiana State University

The Promise of Stem Cells---

Stem cells have evolved as a novel treatment approach for musculoskeletal injuries in athletic horses. Multipotent stromal (stem) cells are immature cells found in adult tissues. They are thought to contribute to normal tissue maintenance and injury by maturing into adult cells as needed. The ability to isolate, grow and selectively increase these cells in the laboratory as well as their ability to become different cell types has been confirmed. The focus has now begun to turn toward determining the best ways to use the cells to meet the needs of individual horses. One way to do this is to use patient cells to grow new or "neo" tissues in the laboratory. In theory, the new tissue can then be applied to treat or replace damaged tissue.



Equine multipotent stromal (stem cell) from bone marrow

We looked at the ability of multipotent stromal cells from bone and adipose tissue to become bone, adipose and cartilage cells and produce neotissue after the cells were loaded onto pieces of collagen called a scaffold. To load the cells, we used a perfusion bioreactor to move the cells suspended in fluid through the scaffold. This is to equally distribute the cells as well as to get the largest number of cells onto the collagen. As the name implies, a scaffold provides a framework for the cells to adhere to and produce tissue.

Cells on Scaffolds---

Cells on scaffolds were grown in conditions for stem cells or for bone, adipose or cartilage. After 7, 14 and 21 days, the distribution of live cells in the scaffolds as well as gene expression and neotissue formation was evaluated. The cells on their collagen scaffolds produced adipose, bone and cartilage neotissue. Though cells from bone marrow tended to have earlier expression of bone and cartilage genes while those from adipose tissue had earlier expression of adipose genes, the "neotissue" produced (bone, cartilage and adipose) was not different between cell types. This may mean that multipotent stromal cells from both tissues may be used for tissue regeneration under similar conditions. Additionally, the perfusion bioreact or may minimize the total number of cells needed for specific neotissue generation. These findings support ongoing efforts to develop equine stem cell tissue regeneration to provide new and improve upon existing treatment options. An abstract about this work titled "In vitro tissue generation by adult equine multipotent stromal cells on collagen scaffolds" is included in the Proceedings of the 58th Annual Convention of the American Associations of Equine Practitioners.