Viable stem cells can survive in horse's ligaments up to 72 hours after death

Adult mesenchymal stem cells (MSCs) are being used in today's clinical practice to regenerate or replace the damaged tissue. Moreover, both autologous and allogenic MSCs have been shown to be effective for tissue repair after injury and disease. However, the restricted number of donors, and the limited amount of material obtained from biopsies are the two main limiting factors for their use.

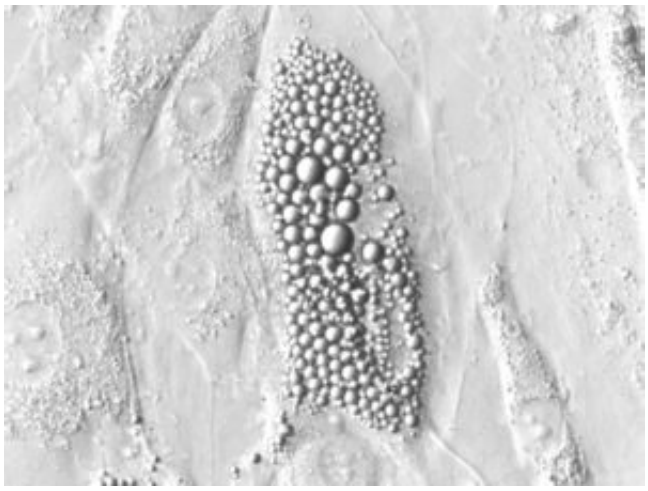

Fig. 1. Phase contrast images of the Adipogenic inductions of equine cadaver mesenchymal stem cells

Taking all these considerations into account, the possibility that cadavers may represent an alternative source of stem cells for tissue maintenance and regeneration is very exciting. Traditionally, it was thought that 48 hours after death, the presence of these stem cells in a necrotic microenvironment led them to lose their utility and potential benefits for experimental and clinical applications. Actually, while the differentiated cells die within two days after death, the MSCs reside in their oxygen-starved tissues in a state of quiescence or dormancy, and survive by adapting to a low rate of oxygen consumption with a slow metabolism and deactivated transcription. Consistently, anoxia and a lack of nutrients participate in the positive selection of more robust and undifferentiated stem cells. The use of cadaveric materials would prevent the need for foetal, embryonic or healthy living donor sources that may help to avoid serious ethical considerations in regenerative medicine applications. Since no data are available in the literature on this topic, our research team has been interested in investigating whether viable MSCs could survive in cadaveric tissues from adult equine ligaments up to 72 hours after death. In our study, we showed for the first time, it is possible to isolate viable MSCs equine cadaver suspensory ligaments (EC-MSCs) up to

72 hours after death.

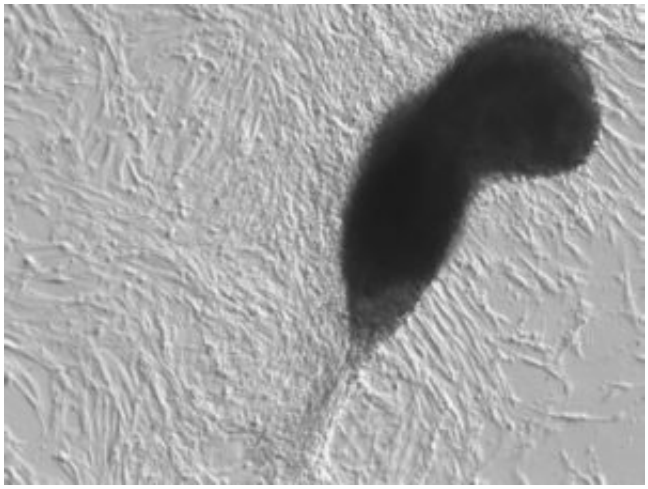

Fig. 2. Phase contrast images of the osteogenic inductions of equine cadaver mesenchymal stem cells

EC-MSCs were successfully maintained for more than 20 passages with high cell viability and proliferation. Differentiation assays, flow cytometry, immunofluorescence and transmission electron microscopy analyses confirmed the stemness of these cells. Taken together, our research may benefit the development of an advantageous source of stem cells for regenerative medicine and cell therapy technologies. EC-MSCs provide a low cost solution in ready supply for the development of novel therapeutic strategies. Although the differentiation of MSCs into neuronal lineage with specific inductions is well-documented, our findings indicate that some EC-MSCs, without any specific external stimulus, are able to spontaneously express neuron-specific class III beta-tubulin (TUJ-1), and glial fibrillary acidic protein (GFAP). In a more specific way, inducing differentiation of EC-MSCs into tenocytes would appear to be a promising approach for the treatment of equine tendinopathies.

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Publication

Tissues from equine cadaver ligaments up to 72 hours of post-mortem: a promising reservoir of stem cells.

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