

Cord tissue and adipose tissue in regenerative medicine: Effects of cryopreservation and donor age

David T Harris
University of Arizona, USA

Mesenchymal stem cells (MSC) can be isolated from adult adipose tissue (AT) as well as neonatal cord tissue (CT). Both CT and AT can be utilized fresh or banked frozen for later applications. However, no study has been performed to examine these variables. Fresh and thawed CT and AT were expanded for 7-14 days to allow for outgrowth of MSCs. Expanded MSCs were analyzed by FACS. For differentiation, cells were grown in tissue specific differentiation media for 21 days and stained with tissue specific agents. *In vitro* assays for wound healing and angiogenesis were investigated by scratch and matrigel assays, respectively. FACS analysis showed no differences in expression of CD45, CD73, CD90 and CD105 between CT-MSC and AT-MSC, fresh or frozen. CT-MSC showed more proliferative potential than AT-MSC. Interestingly, when cultured in low numbers to determine colony forming units, CT-MSC showed less CFUs than AT-MSC. Cells from both sources (fresh and frozen) efficiently differentiated into adipose, bone, cartilage and neuronal structures as determined with histochemistry, immunofluorescence and real time RT-PCR. There was no difference in either the number or time of population doublings over the course of the experiment for fresh versus frozen tissues regardless of source. With the exception of osteocalcin, no significant difference was observed between fresh and frozen differentiated MSC. However, donor age had a significant influence on the differentiation capacity of AT-MSC in terms of proliferation, osteogenesis and chondrogenesis. In conclusion, MSC can easily be obtained from both tissues and it appears that adipose and cord tissues are suitable sources of stem cells for regenerative medicine, whether utilized fresh or previously banked frozen.

Biography

Dr. Harris is a graduate of Wake Forest University in Winston-Salem, North Carolina where he obtained Bachelor of Science degrees (cum laude) in Biology, Mathematics and Psychology in 1978. He earned a Masters of Medical Sciences (summa cum laude) from Bowman Gray Medical School in 1980 and his Doctorate in Microbiology and Immunology (magna cum laude) from Bowman Gray Medical School in 1982. From 1982-1985 Dr. Harris was a Post-doctorate Fellow at the Ludwig Institute for Cancer Research in Lausanne, Switzerland. In 1985 he joined the faculty at the University of North Carolina-Chapel Hill as a Research Assistant Professor in the Department of Medicine. In 1989 Dr. Harris joined the faculty at the University of Arizona in Tucson as an Associate Professor in the Department of Microbiology & Immunology. In 1996 Dr. Harris was promoted to Professor of Immunology. Dr. Harris established the first cord blood bank in the USA in 1992. He currently serves as Director of the Cord Blood Stem Cell Bank, is a member of the Arizona Cancer Center, a member of the Children's Research Center, and a member of the Arizona Arthritis Center.

davidh@email.arizona.edu