Comparison of cord tissue and adipose tissue for use in tissue engineering: Effects of cryopreservation and donor age

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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. 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
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. Dr. Harris’s research interests include stem cells and regenerative medicine, cancer research/stem cell transplantation and gene therapy. He has published more than 300 articles (papers, book chapters and abstracts), given more than 100 talks on stem cells over the past 7 years, and has served as a consultant to the governments of China, Hong Kong, Singapore and South Korea. Dr. Harris has also founded 4 companies while at the University of Arizona; Cord Blood Registry, Inc.; ImmuneRegenBioSciences, Inc.; QuReGen, Inc. and AdiCyte.

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