CellShip[®]: Transporting canine stem cells for clinical application, without cryopreservation.

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Background

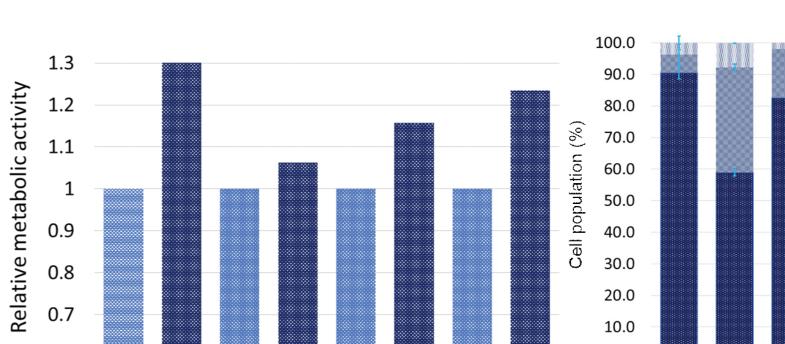
field of regenerative medicine for both research The and clinical application is expanding rapidly, in both human veterinary practice. In veterinary practice, and use of autologous stem cells to treat conditions such the osteoarthritis in companion animals is becoming as increasingly routine. Following MSCs isolation and expansion from an adipose biopsy the cells are cryopreserved and returned to the veterinary practice for administration, using dry ice.

This process presents several logistic issues, including cost of transport, specialist handling and scheduling limitations.

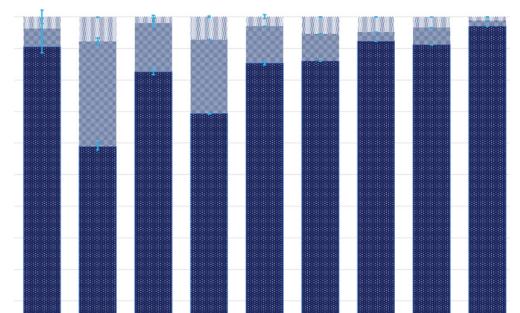
Methods

Results

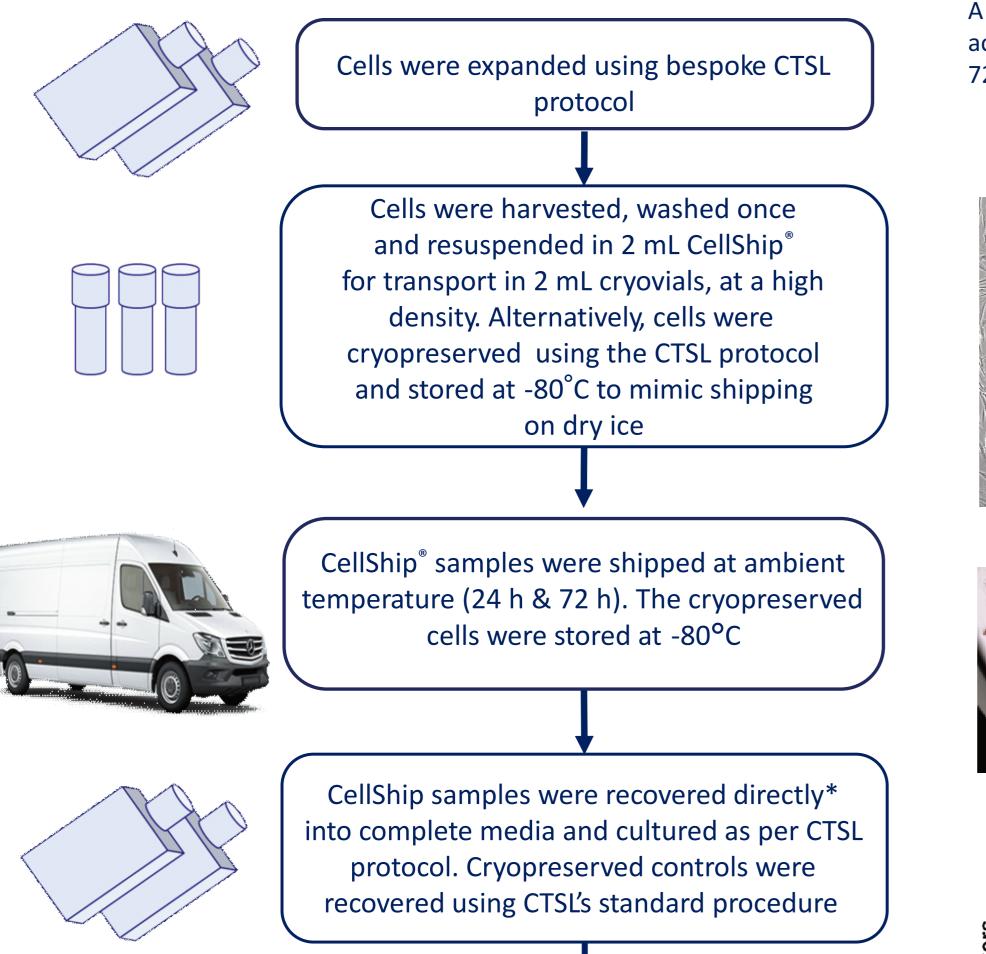
For each donor, MSCs transported in CellShip[®] showed a lower proportion of pre-apoptotic cells than the controls, and metabolic activity was either slightly higher or comparable to the controls. CD marker analysis presented comparable results between transport methods. Regardless of the transport method, cells were able to undergo chondrogenesis, osteogenesis and adipogenesis.

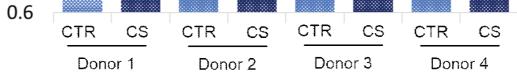


Cell viability following 72 h transport (Annexin V/PI)



Primary adipose derived canine MSCs were provided by our collaborator Cell Therapy Science Ltd (CTSL), from excess clinical material with owner agreement. Cell numbers were increased using CTSL's bespoke protocols.

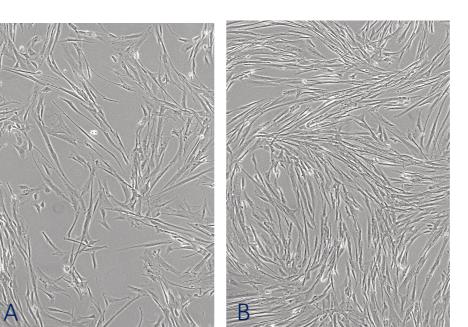




Relative metabolic activity following 72 h transport

CS: CELLSHIP® CTR: Cryopreserved control

A WST-1 assay was used to assess metabolicactivity.Cellswereanalysedfollowing72 h transport (cell numbers normalised).

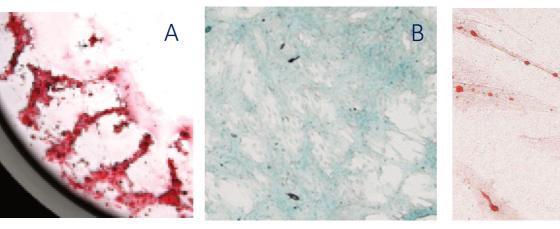




Alive Pre-apoptotic Necrotic

For each donor, MSCs transported in CellShip[®] showed a lower proportion of pre-apoptotic cells than the controls, and metabolic activity was either slightly higher or comparable to the controls.

Following 72 h transport, cell numbers were normalised and they were recovered for 6 days. The increased confluency in flask B indicates that cells recovering from transport in CellShip re-enter the cell cycle more quickly than cells recovered from cryopreservation.

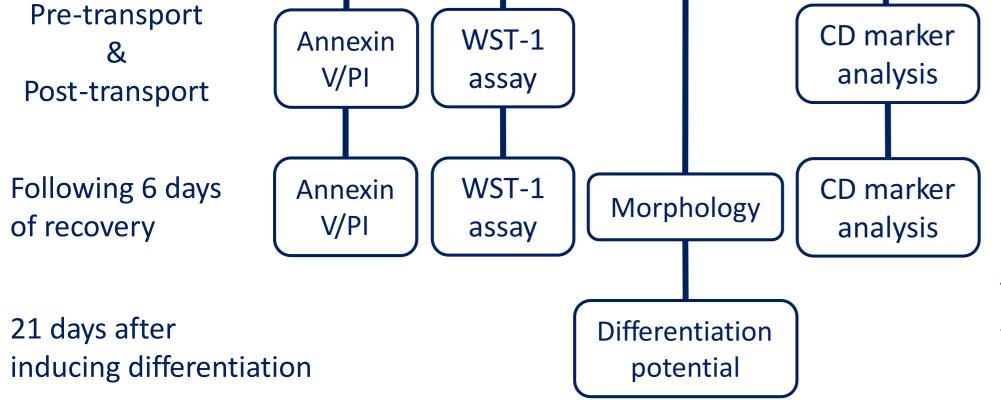


Expression of CD markers for five donor dogs following transportation



Cells transported in CellShip[®] maintain their differentiation potential and are able to undergo osteogenesis (A), chondrogenesis (B) and adipogenesis (C).

80 CD marker expression was assessed
60 using flow cytometry. Cells were
analysed following 72 h transport.
40 Expression was comparable between



*There is no need to remove CellShip[®] before recovery.

20 cells transported in CellShip[®] and the CD90controls. CellShip-CellShip-CellShip CellShip Cryo CellShip Cryo Cryo Cryo Cryo Donor 2 Donor 5 Donor 1 Donor 3 Donor 4

Conclusion

This pilot study suggests that CellShip[®] may provide a suitable alternative to cryopreservation and transportation of primary canine MSCs using dry ice, thereby reducing the logistic and cost challenges associated with cryogenic cell transport.





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