Developing neural transplant cell sprays for traumatic neurological injuries

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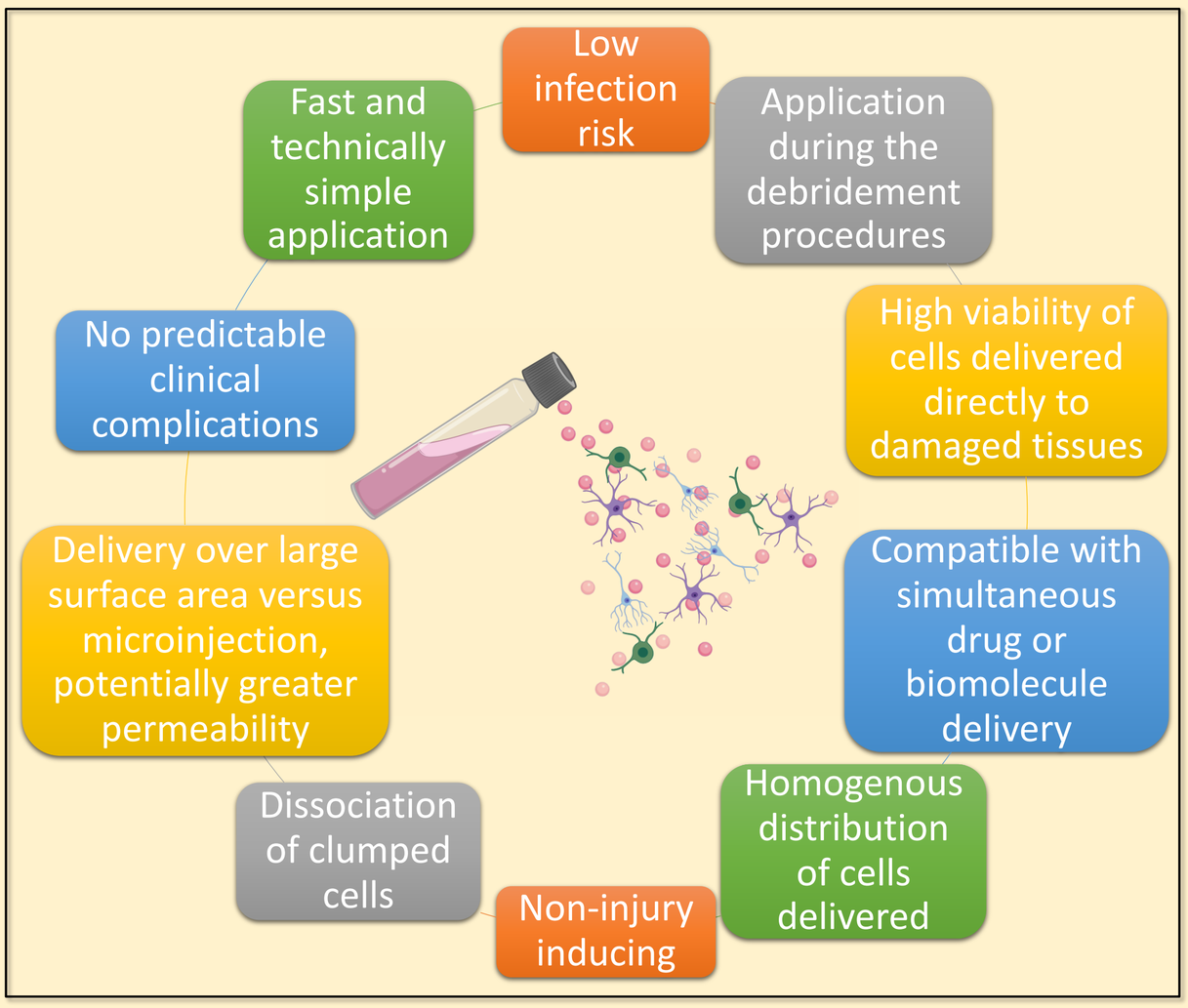
Background

Clinical need: Traumatic neurological injuries drastically impact patients and their support networks, with high healthcare costs.
Enhancing neuro-regeneration is a major clinical challenge.
Neural cell transplantation therapies have significant translational potential to promote regeneration.

However, there are major drawbacks with current cell delivery methods (surgical microinjection & vascular delivery): (1) haemorrhage, needle induced tissue destruction or embolism, (2) high cell loss on injection through fine needles into dense neural tissue, (3) systemic clearance and loss of cells delivered intravascularly, (4) inhomogeneous cell distribution.

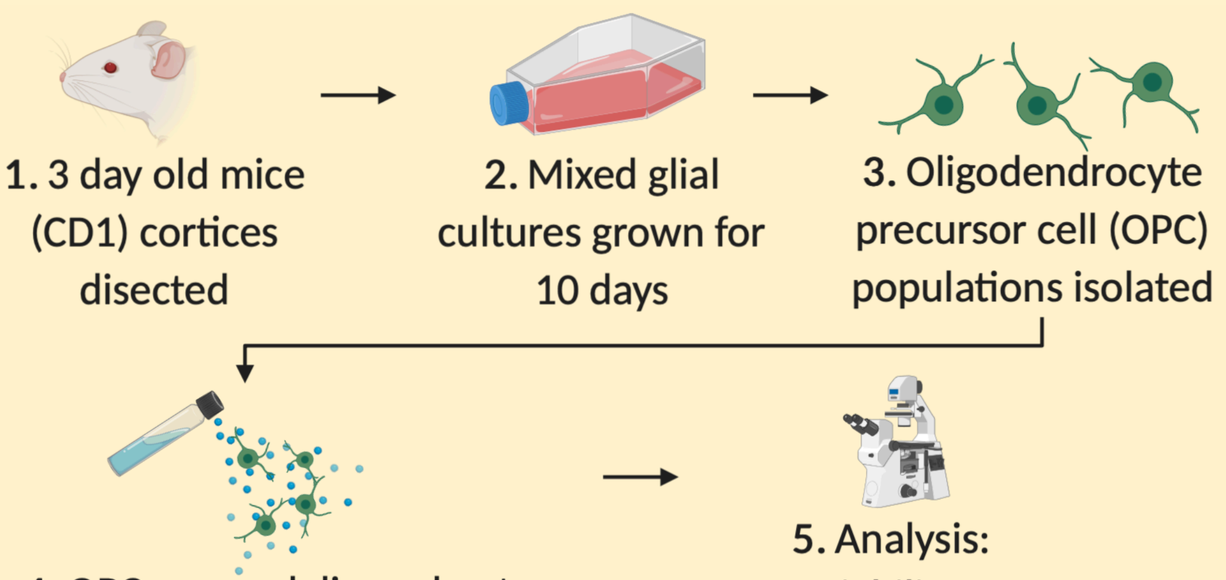
*Hypothesis: Stem c*ell spray delivery can offer significant translational benefits for cell therapy over current delivery methods (summarised below).



Aims

To assess if spray delivery of neural transplant cells is safe, using a major neural transplant population with therapeutic potential in neurological injury.

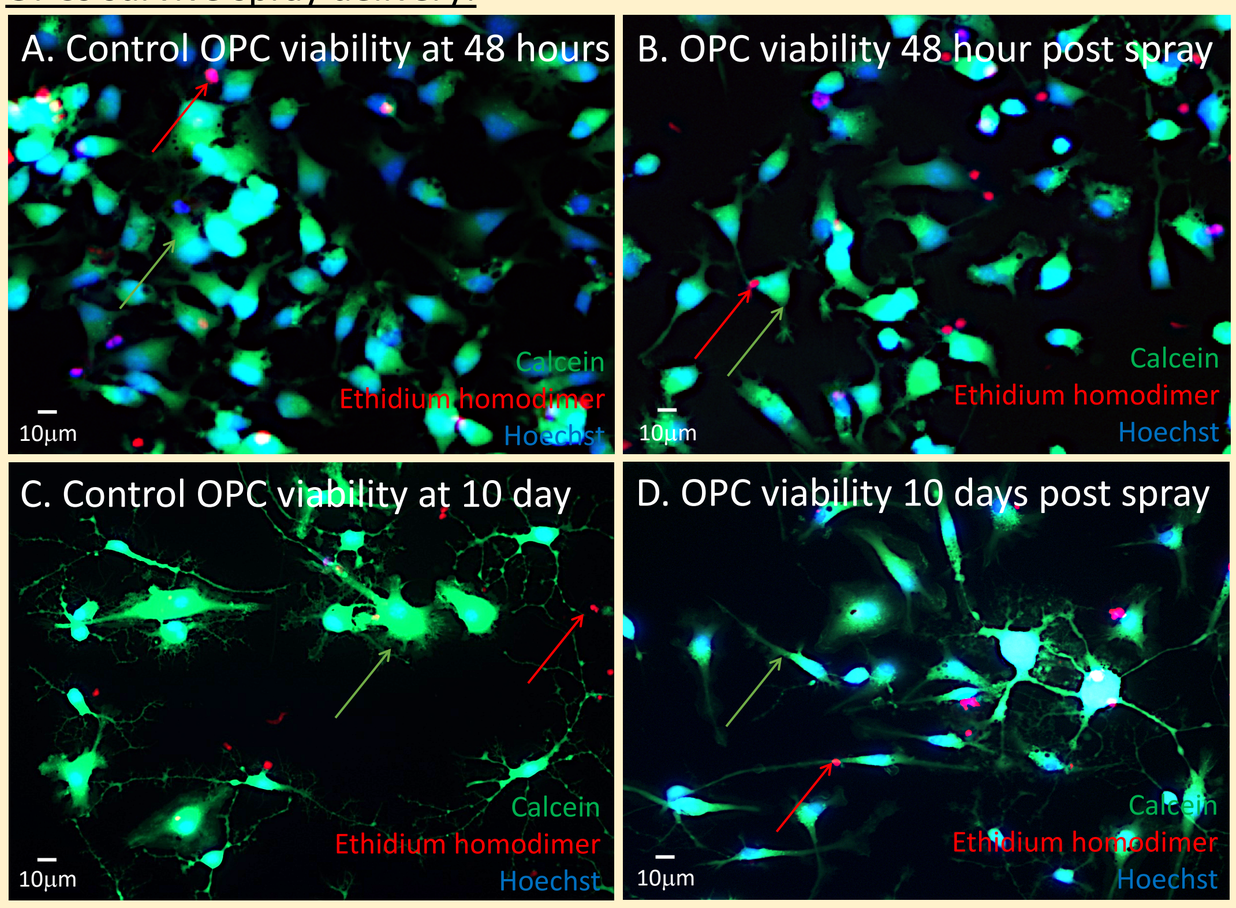
Methods

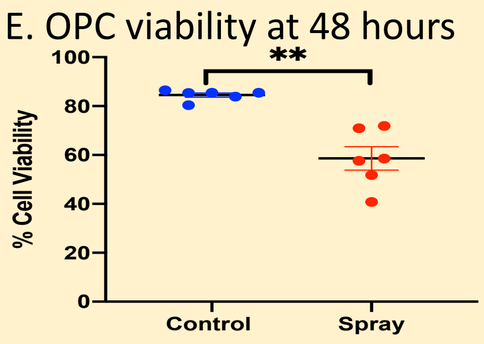


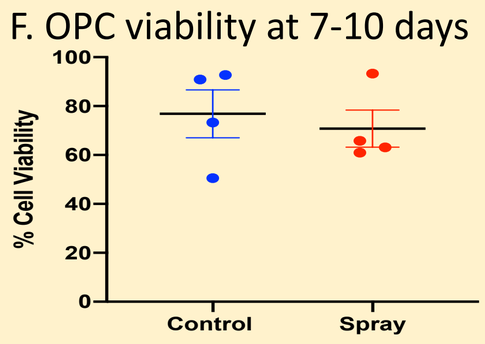
Acknowledgements: Keele School of Medicine Intercalated Degree programme, Faculty of Natural Science Research Support Fund.

Results

OPCs survive spray delivery:

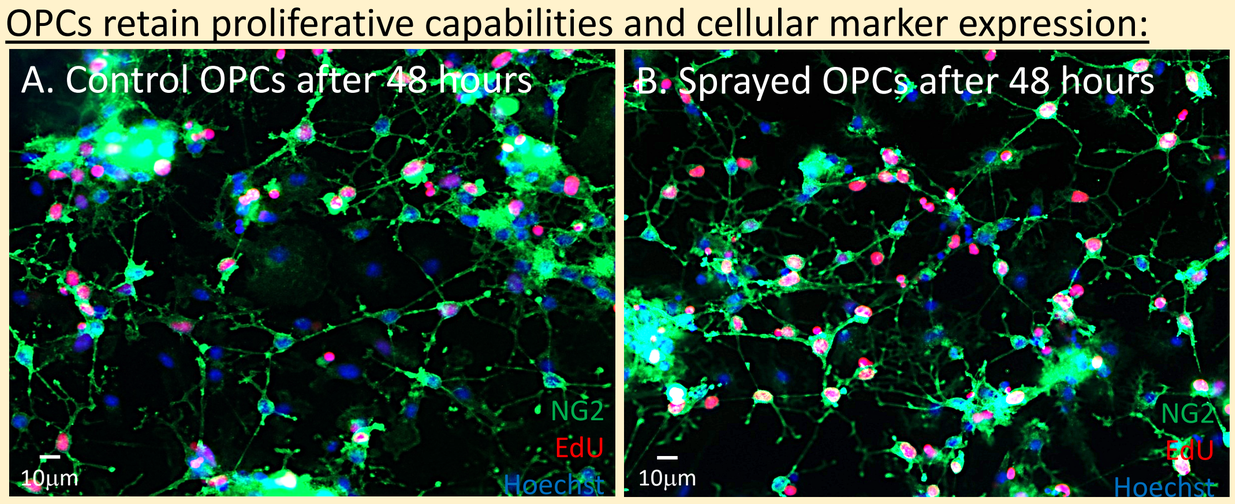


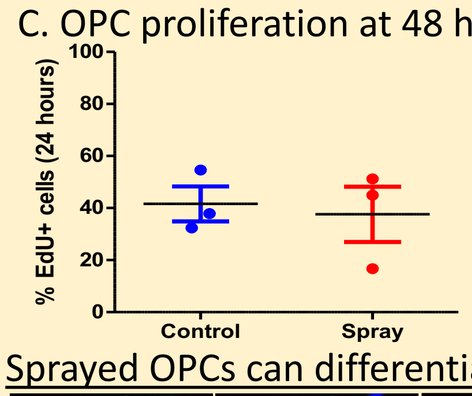


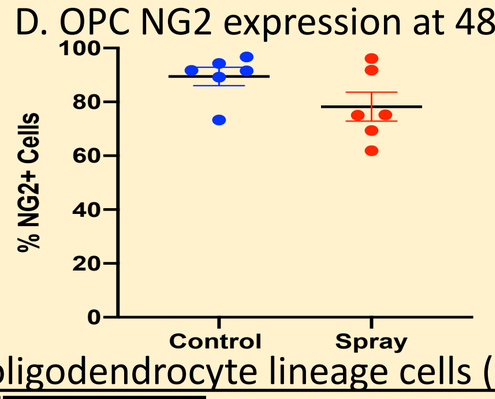


** indicates 0.01>p>0.001, Mann-Whitney test

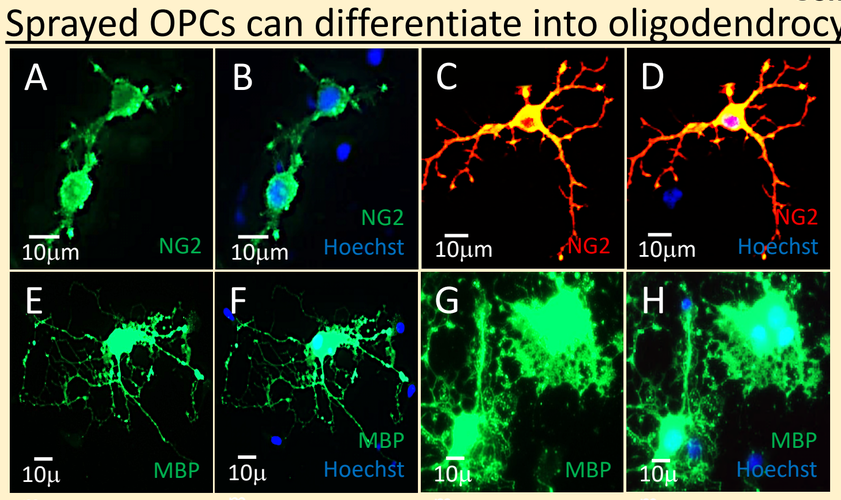
OPCs retain proliferative capabilities and cellular marker expression:



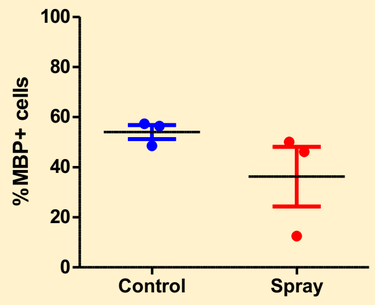




Sprayed OPCs can differentiate into oligodendrocyte lineage cells (OLCs):



I. MBP (oligodendrocyte marker) expression at day 10



Sprayed OPCs differentiated into a full range of OLC morphologies; OPC (A+B), pre-oligodendrocyte (C+D), immature oligodendrocyte (E+F), mature oligodendrocyte (G+H).

Conclusions

Spray technology could offer a novel clinical solution for neural cell delivery in transplantation therapies for traumatic neurological injuries.