In vitro Characterization Of Different Decellularization Protocols for Peripheral Nerve Grafts Preparation.

Poster No:

1496

Authors:

Marwa El Soury[1,2], Óscar Darío García-García[3,4], Miriam Metafune[5], Matteo Moretti[6], Isabelle Perroteau[5,7], Stefania Raimondo[5,7], Arrianna Barbara Lovati[6], Victor Carriel[8,9]

Institutions:

[1]Neuroscience Institute Cavalieri Ottolenghi (NICO), Torino, Torino, [2]Nerve regeneration Group, Department of Clinical and Biological Sciences, University of Torino, Torino, Italy, [3]Tissue Engineering Group,Department of Histology, University of Granada, Granada, Spain, [4]Instituto de Investigacion Biosanitaria, Ibs.GRANADA, Granada, Spain, [5]Dipartment of Clinical and biological sciences, Orbassano, Torino, [6]IRCCS Istituto Ortopedico Galeazzi, Cell and Tissue Engineering Laboratory, Milan, Italy, [7]Neuroscience Institute Cavalieri Ottolenghi (NICO), Orbassano, Italy, [8]Tissue Engineering Group,Department of Histology, University of Granada., Granada, Granada, [9]Instituto de Investigacion Biosanitaria, Ibs.GRANADA, Granada, Spain, Granada, Spain

Introduction:

In critical nerve gaps, where tensionless repair is unapplicable, a nerve graft or conduit are needed to connect the two nerve stumps. Decellularized nerve allografts are a promising tissue engineering strategy. Their superiority over nerve conduits is owed to the availability of natural well-conserved extracellular matrix (ECM) components that has proven to play an important role in supporting axonal guiding and peripheral nerve regeneration.
The known decellularization techniques nowadays are time and effort consuming. In the present work performed on rat sciatic nerves, we investigated a novel nerve decellularization protocol able to combine an effective decellularization in short time with a good ECM preservation.

Methods:

Two different decellularization protocols were tested. The first protocol - proven to be efficient for decellularizing tendons (DN-P1), using 1% tri(n-butyl) phosphate (TBP), 3% peracetic acid (PAA) (Lovati et al., 2016) - was compared with a decellularization protocol specifically developed for nerves (DN-P2), using 125mM SB-10, 0.2% TritonX-100, 0.25% SDS, and sonification cycles (Boriani et al.; 2017). The outcomes of both decellularization protocols were assessed by a series of in vitro evaluations, including qualitative and quantitative histological and immunohistochemical analyses, DNA quantification, SEM and TEM ultrastructural analyses, mechanical testing, and viability assay.

Results:

Both decellularization protocols had led to an overall well-preserved nerve structure; DNA quantification showed that DNA content was significantly decreased, but not completely removed.

Both protocols had less cellular component, but complete removal was not achieved; an adequate amount of ECM component is still conserved in both protocols. DN-P1 has better biomechanical properties, superior biocompatibility and ultrastructural properties compared to DN-P2.

Conclusions:

DN-P1 greatly demonstrated superior results compared to DN-P2 in terms of ultrastructural analysis and biocompatibility. Decellularized nerve allografts prepared following DN-P1 protocol are promising for long gap repair in vivo.

Special Interest Group:

Neuropathic Pain Consortium (NPC)

Biology:

Axon

Clinical:

N/A

Techniques:

Imaging

Additional Information

The abstract submitted reports the results of a Clinical Study (i.e., a prospective study of a new test or treatment in humans)

No

Does the abstract submitted primarily report on basic science research?

Yes

Has your abstract previously been presented at a national/international meeting?

Yes

If yes, please cite the meeting:

93 th congress SIBS "Società Italiana di Biologia Sperimentale ", Palermo (online), Italy.

Was this abstract previously presented at the 2022 PNS Annual Meeting in Miami, Florida, USA?

No

Field

Scientist

Author Approval

Please confirm your plans for attendance at the PNS Annual Meeting in Copenhagen.

I plan to attend the PNS Annual Meeting in Copenhagen. I understand that there is no option for an e-poster.

Keywords

Keyword 1

Nerve Allograft

Keyword 2

Decellularization

Keyword 3

Nerve Repair

Prizes

Membership Status Note: Junior PNS Members, please click here (https://account.pnsociety.com/i4a/ams/public/member_start.cfm?mbrAppID=1&pageID=3516) to view the membership criteria.

Non-Member

References

I have references I would like to disclose.

No

Travel Grants

Would you like to apply for a PNS Travel Grant?

No