

1. Technical details:

- Title

NOVEL BIOENGINEERED WRAPS FOR NERVE INJURY WITHOUT SUBSTANCE LOSS: A PRE-CLINICAL STUDY

- Keywords (separated by commas)

Tissue engineering, peripheral nerve injury, wraps

- Text (max. 250 words)

Introduction. In case of peripheral nerve injuries (PNIs) without substance loss, end-to-end nerve repair adjuvated by implantation of an absorbable nerve wrap improves the repair outcomes. The aim of the study was to assess the preclinical efficacy of two novel biodegradable wraps based on synthetic oxidized polyvinyl alcohol (OxPVA) and a natural leukocyte-fibrin-platelet membrane (LFPm) we developed, versus the commercial product NeuraWrap™.

Material and methods. After sciatic nerve transection and neurorrhaphy, thirty Sprague-Dawley rats were randomly implanted with a) NeuraWrap™; b) OxPVA; c) LFPm wraps. Twelve weeks later, functional recovery was assessed and explanted nerves underwent to morphological and morphometric study by histology (hematoxylin and eosin staining - H&E; Toluidine-Blue staining) and immunohistochemistry (anti-CD3, -F4/80, -S100 - β -tubulin staining); ultrastructural analysis was performed by Transmission Electron Microscopy (TEM).

Results. All wraps assured nerve function recovery; no scar tissue/neuromas were visible at dissection. LFPm-wraps were completely resorbed, while residues were observed for OxPVA and NeuraWrap™. In all groups, biocompatibility was confirmed by absence of significant inflammatory infiltrate as showed by histology and immunohistochemistry (CD3 and F4/80) which also proved the nervous origin of the repaired tissue (S-100 and β -tubulin), later assessed also by TEM. According to morphometry, OxPVA and LFPm wraps were effective in promoting nerve regeneration especially in the distal portion.

Conclusions. Bioengineered OxPVA and LFPm wraps promoted lesion recovery and may be considered an interesting alternative to the commercial NeuraWrap™.

- Presentation type (to choose between poster or oral).

Oral presentation

- Topic (to choose one from the following):

- Regional's code

Lower limb

- Sistem's code

Neuroanatomy

- Section

Peripheral nervous system

2. Authors details

- Contact person:

Andrea Porzionato

- List of authors (please indicate who will be presenting the abstract and provide his/her email address):

Porzionato Andrea^{1,2}, Stocco Elena^{1,2}, Barbon Silvia^{1,2}, Tiengo Cesare³, Petrelli Lucia¹, Parnigotto Pier Paolo⁴, Macchi Veronica^{1,2}, Grandi Claudio^{4,5}, De Caro Raffaele^{1,2}

1 Section of Human Anatomy, Department Neurosciences, University of Padua, Via Gabelli 65, 35121, Padua, Italy

2 LifeLab Program, Consorzio per la Ricerca Sanitaria (CORIS), Veneto Region, Via N. Giustiniani 2, 35128 Padova, Italy

3 Clinic of Plastic Surgery, Department Neurosciences, University of Padua, Via Giustiniani 2, 35128, Padua, Italy

4 Foundation for Biology and Regenerative Medicine, Tissue Engineering and Signaling (TES) ONLUS, Via De Sanctis 10, Caselle di Selvazzano Dentro, 35030 Padua, Italy

5 Department of Pharmaceutical and Pharmacological Sciences, University of Padua, Via Marzolo 5, 35131 Padua, Italy

Presenting Author: andrea.porzionato@unipd.it