2022 NEHS Annual Meeting Abstract Submission

COMPLETE

NEHS Vice President, Daniel Mastella, M.D., is currently accepting abstract submissions for presentation at our Annual Meeting on December 2, 2022.

This meeting will be held at the Sturbridge Host Hotel in Sturbridge, MA.

Therapists, NPs, and PAs are also encouraged to submit.

THE DEADLINE FOR SUBMISSION IS OCTOBER 15, 2022

RESIDENTS AND FELLOWS ONLY. Please indicate if you want your paper to be considered for the prestigious H.Kirk Watson, M.D. Founder's Award. The abstracts for award consideration will be presented in the morning and the award will be presented in the afternoon.

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*** ABSTRACT TITLE**

The effects of collagen matrix wrapping and fibrin glue coating on the prevention of scar tissue formation after peripheral nerve injury

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*** Name of who will present abstract at NEHS meeting on December 2, 2022 Please note that the same person cannot present more than one abstract at the meeting.**

Maximilian Mayrhofer-Schmid

*** Please indicate if the presenter is:**

Not currently a resident or fellow

*** List full names of abstract authors**

Maximilian Mayrhofer-Schmid, Martin Aman, Daniel Schwarz, Tess T.-A. Klemm, Martin Bendszus, Ulrich Kneser, Leila Harhaus, Arne H. Böcker

* ABSTRACT - should include background information and a description of methods, programs, or practices.

Introduction
Perineural scarring after peripheral nerve injuries with resulting functional limitations and neuropathic pain represents a major clinical challenge in hand surgery. Despite extensive research, there is no gold standard for avoiding scar-related nerve compression. One previously described prevention method is to place an autologous or synthetic spacer between the nerve and the direct environment. This study aims to investigate the potential of a fibrin glue as well as an acellular collagen matrix, both of which are already in clinical use for other indications, for nerve wrapping to prevent postoperative scar tissue formation.

Materials and methods
Using the rat sciatic nerve model, 40 animals were separated into one sham group and three groups treated with 2.5% glutaraldehyde to induce scar tissue formation with either no additional intervention, or collagen matrix wrapping, or fibrin glue coating.
Functional assessment of peripheral nerve regeneration was performed weekly during the 12-week observation period by Visual SSI. Histological analysis of the nerve specimen and the surrounding scar tissue as well as assessment of the wet target muscle weight were done postmortally.

Results
The collagen matrix group demonstrated significantly faster functional recovery. In histological analysis, the connective tissue area measurement showed significantly less scar thickness in the fibrin glue group ($p=0.037$) the collagen matrix group ($p=0.005$). Histomorphological analysis also showed improved axon density in the collagen matrix group ($p=0.029$) and increased axon thickness in both the collagen ($p<0.001$) and fibrin ($p=0.003$) groups. No statistically significant difference was found in any of the histological analyses between the sham group and both intervention groups.

Conclusion
Both methods of nerve wrapping successfully prevented extensive scar tissue formation, while the collagen matrix showed superior effects. Therefore, applying a biodegradable collagen spacer around peripheral nerves may have significantly beneficial effects on the formation of scar tissue in the long run. The enormous benefit of these findings lies in the immediate application options for the clinical setting in peripheral nerve surgery.

Please attach files with diagrams and/or photos to support your abstract (10 MB limit)

figures_nervescartissue_mms.pdf

* Please attach the abstract presenter's CV

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The effects of collagen matrix wrapping and fibrin glue coating on the prevention of scar tissue formation after peripheral nerve injury: supplementary material

M. Mayrhofer-Schmid[1, 2], M. Aman[1], D. Schwarz[3], T. Klemm[1], M. Bendszus[3], U. Kneser[1], L. Harhaus[1], A. Böcker[1]

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Abbreviations: CM = Collagen Matrix, FG = Fibrin Glue, GA = Glutaraldehyde

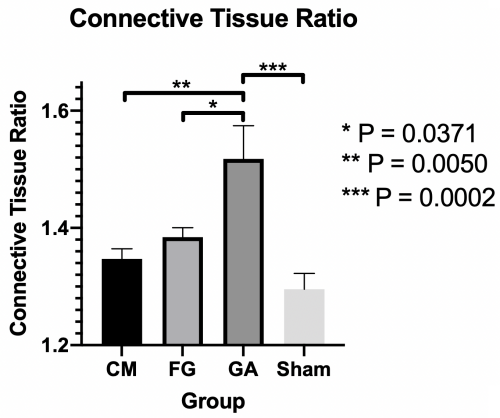

Figure 1: *Quantitative analysis of perineural scar formation*
In comparison to GA, the use of supplemental CM and FG both significantly reduced perineural scarring. Interestingly, the ratio of scar tissue of CM and FG both produced outcomes similar to sham.

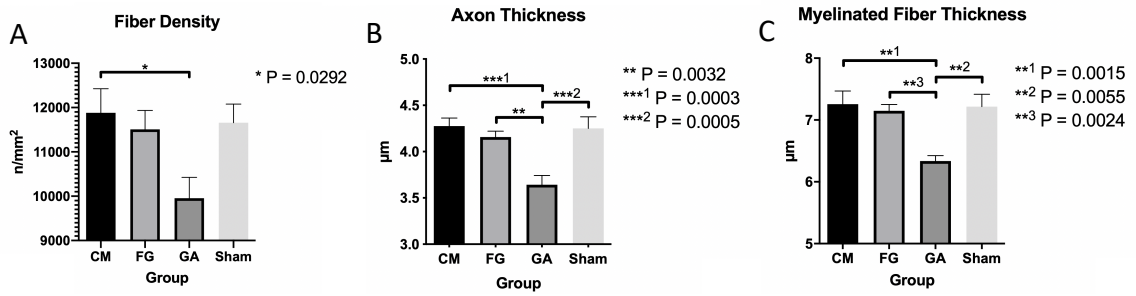

Figure 2: *Quantitative analysis of the nerve fiber morphology*
Histomorphological analysis also showed improved axon density in the collagen matrix group ($p=0.029$) and increased axon thickness in both the collagen ($p<0.001$) and fibrin ($p=0.003$) groups. No statistically significant difference was found in any of the histological analyses between the sham group and both intervention groups.