

RÉHABILITATION DU NERF FACIAL CHEZ LE RAT : DÉVELOPPEMENT D'UN CONDUIT ALLOGÉNIQUE À PARTIR DE LA GELEE DE WHARTON (RENEW)

Laboratoire UR BIOS

Année de recherche - Master 2 Sciences chirurgicales (Paris Saclay)

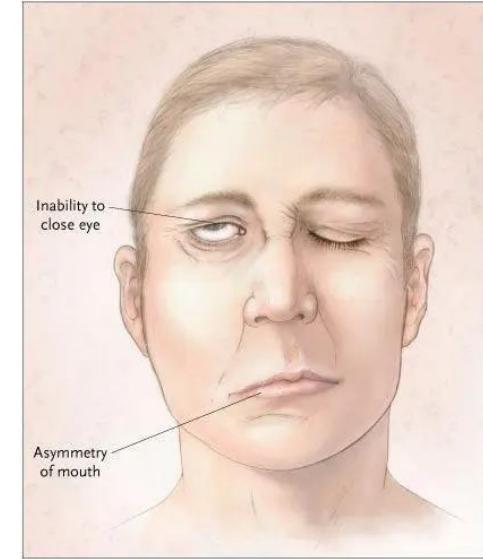
Encadrants : Dr Brenet et Pr Kerdjoudj

Elise Krawiec – Interne d'ORL

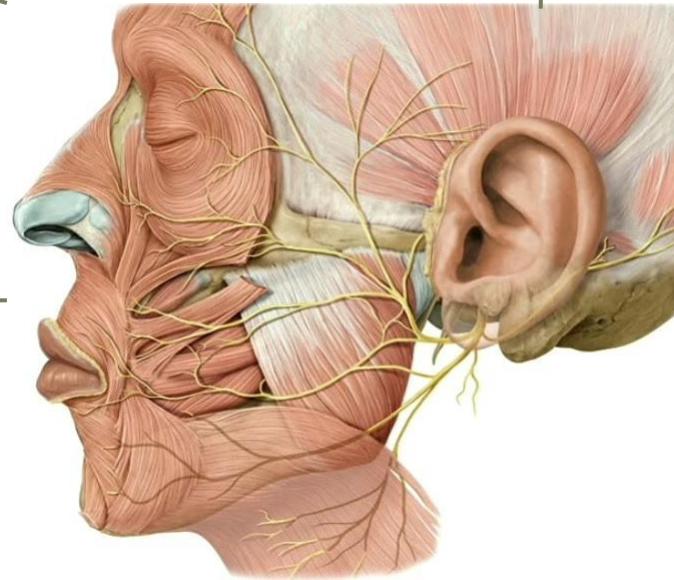
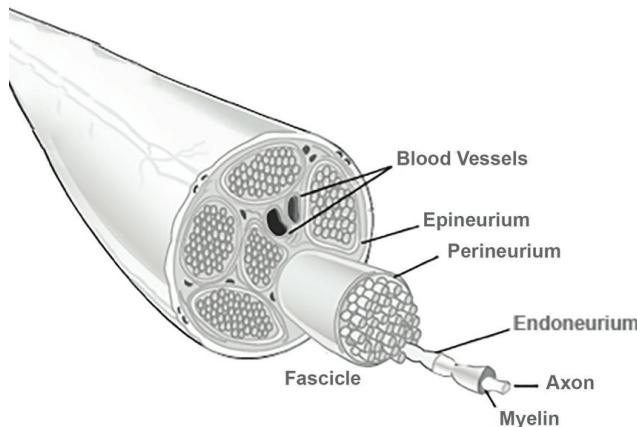
Innervation :

- Motrice
- Sensitive
- Végétative
- Sensorielle

Atteinte = PARALYSIE FACIALE PERIPHERIQUE



Nerf périphérique moteur

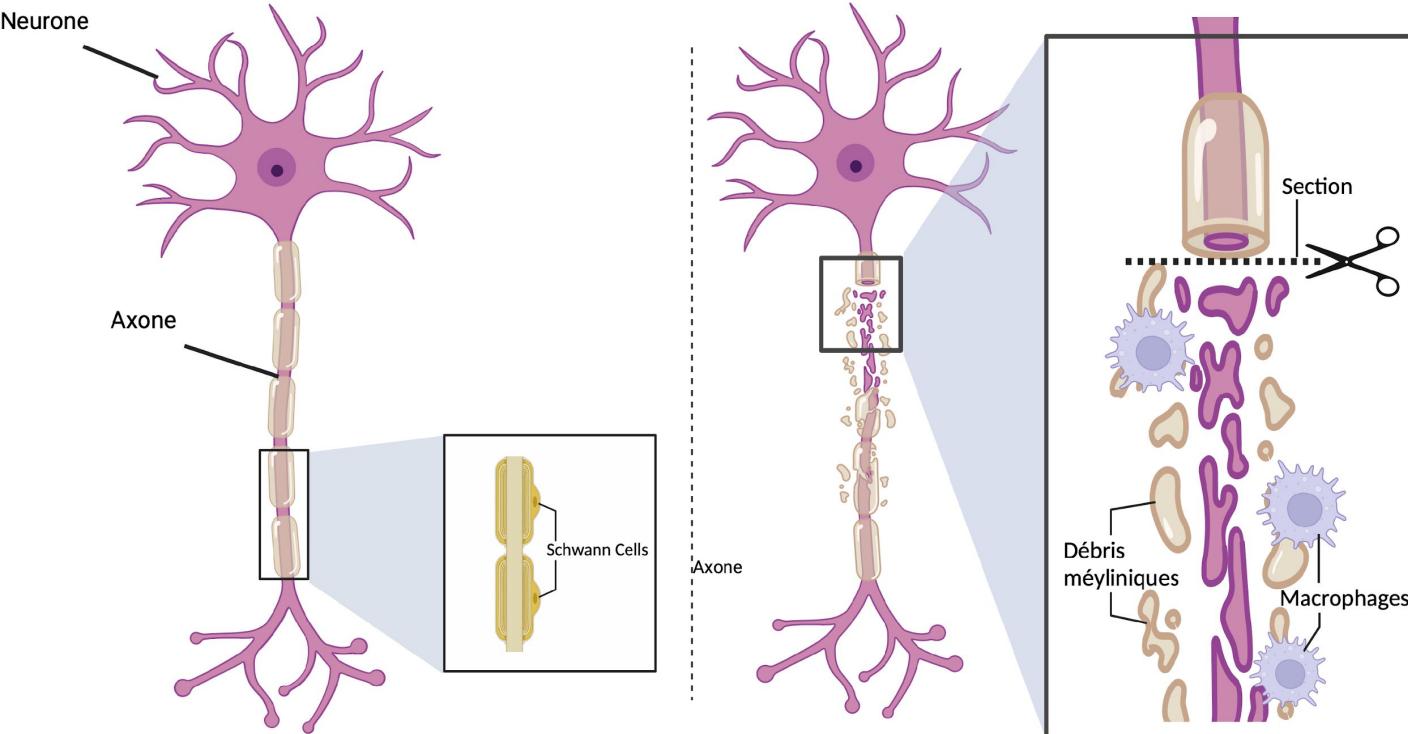


NERF FACIAL (VII)

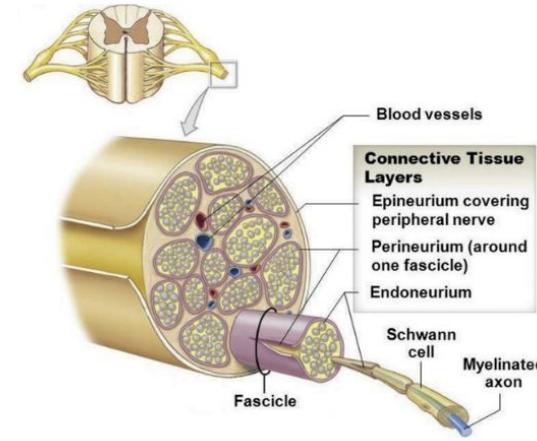
Causes :

- Traumatiques
- Tumorales (rocher, parotide)
- Iatrogénie chirurgicale

Conséquences précoces et tardives fonctionnelles et esthétiques

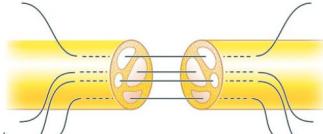
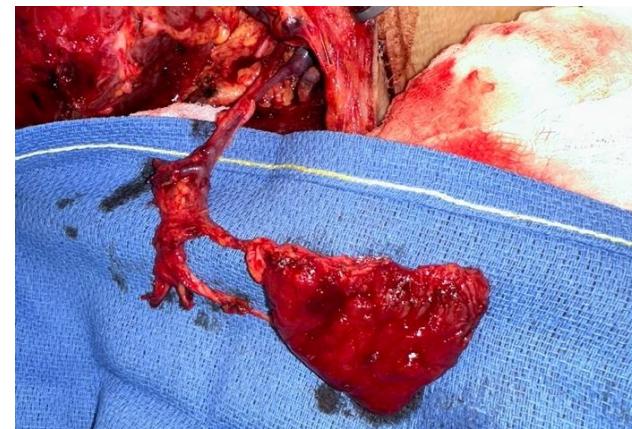
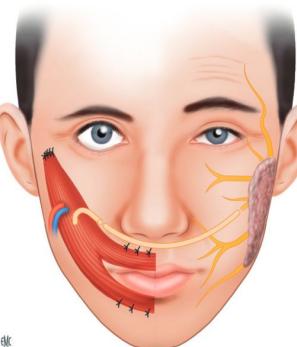
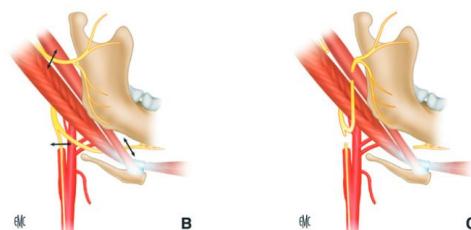
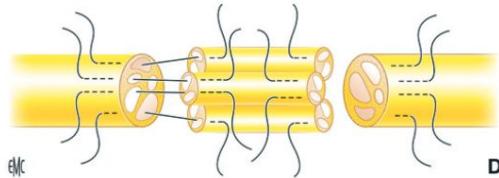


Enjeu principal = régénération axonale



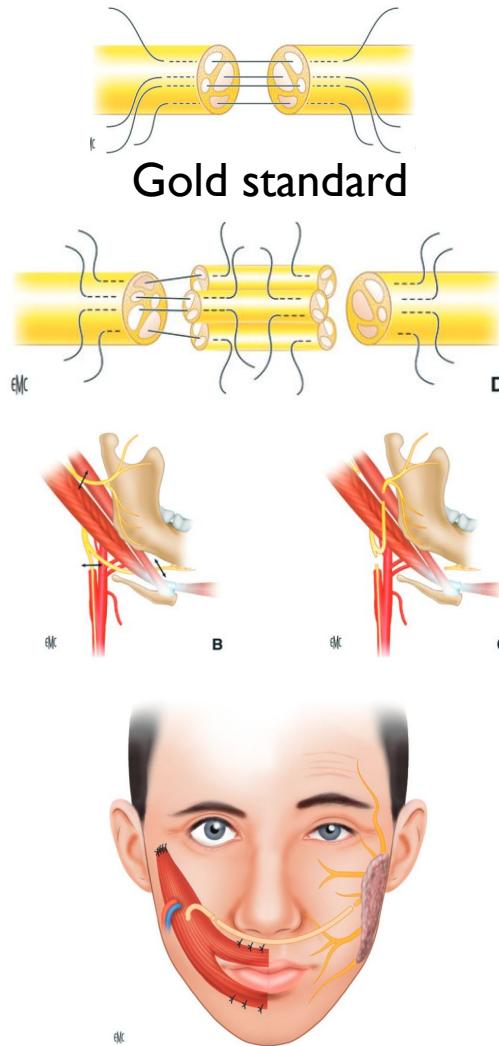
- Formation unités régénérantes
- Secundoirement myélinisées par les cellules de Schwann

- Alignement axonal
- Environnement enrichi en facteurs de croissances et neurotrophiques

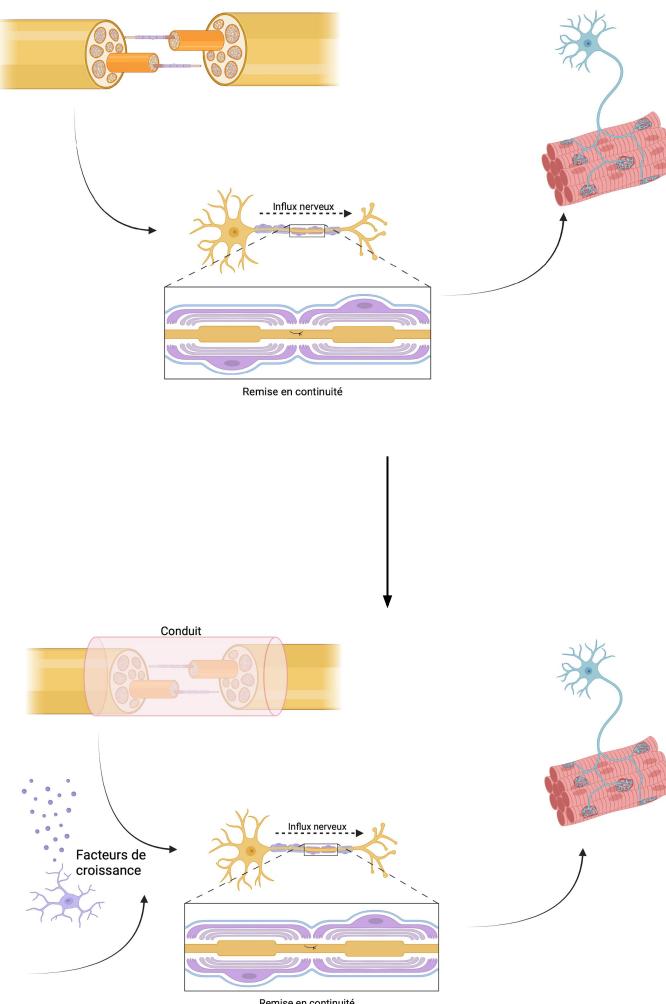
Techniques actuelles**Gold standard**

- Temps chirurgicaux longs
- Nombre limité de greffons
- Courbe d'apprentissage

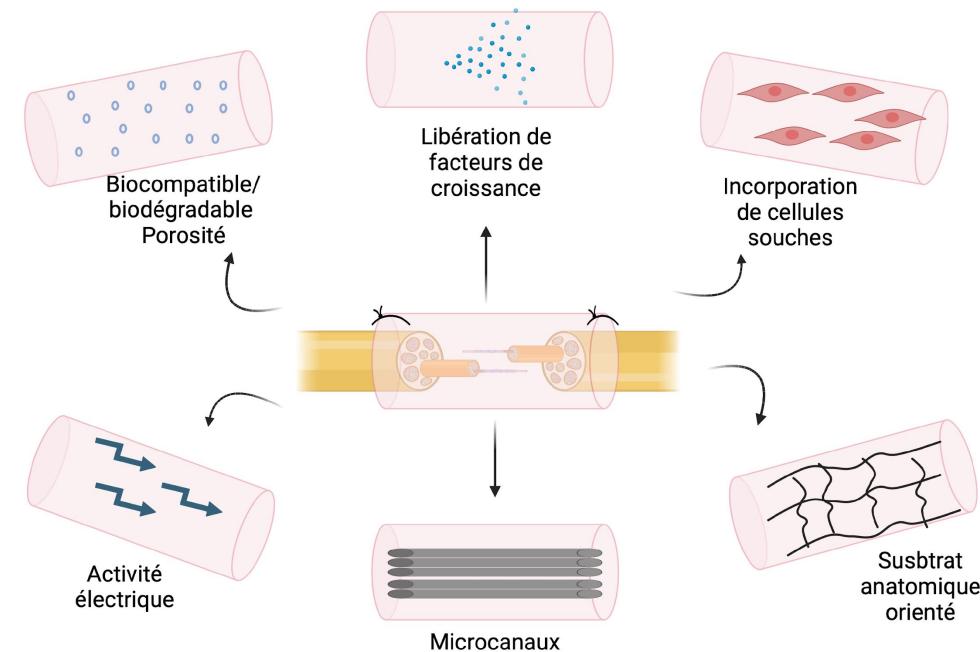
Techniques actuelles

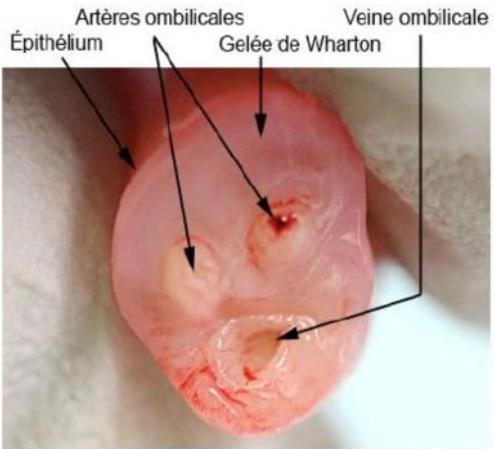


Ingénierie tissulaire



- Guider la repousse axonale
- Facteurs de croissances
- Conduits biodegradables





Objectifs

1

Elaboration d'un conduit applicable à la régénération nerveuse à base de la gelée de Wharton

2

Caractéristiques biochimiques et propriétés biologiques

3

Impact du conduit sur la régénération nerveuse dans un modèle de défaut du nerf facial

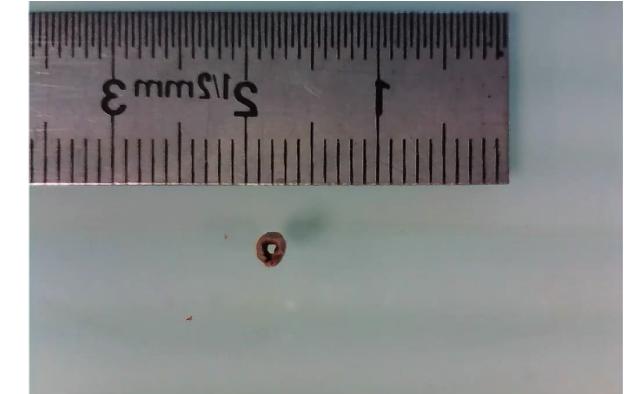
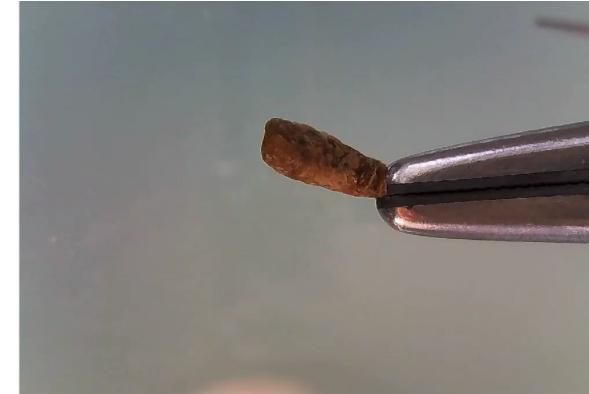
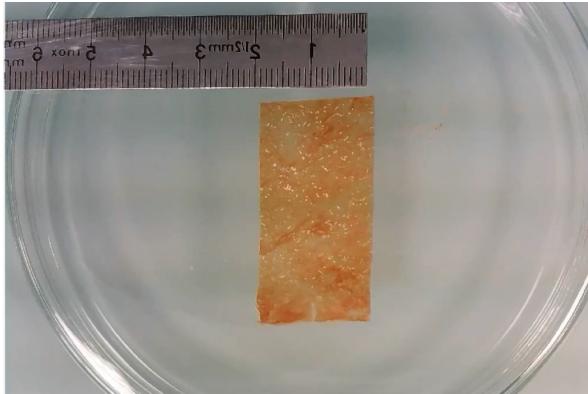
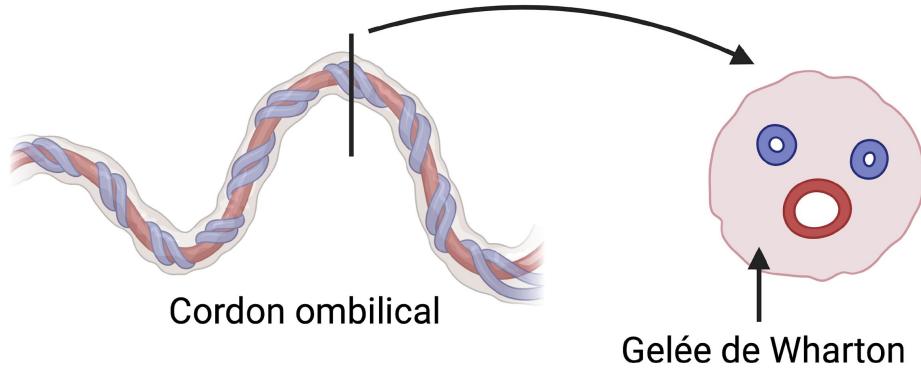
- Analyse clinique
- Analyse histologique

Propriétés :

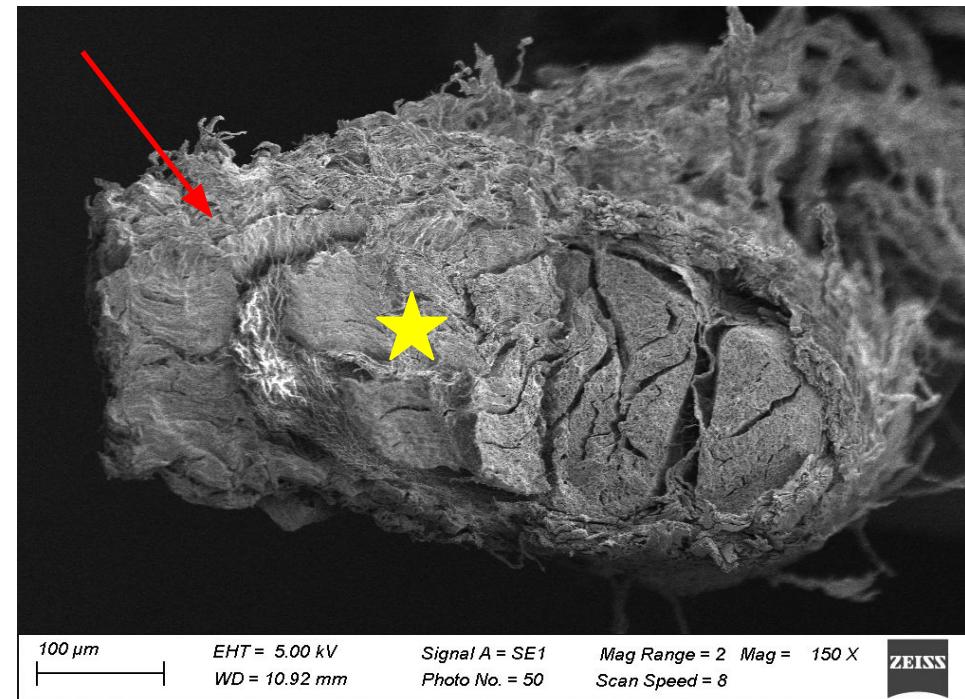
- Antioxydante
- Antibactérienne
- Pro angiogénique
- Ostéorégénératrice



Conception des conduits

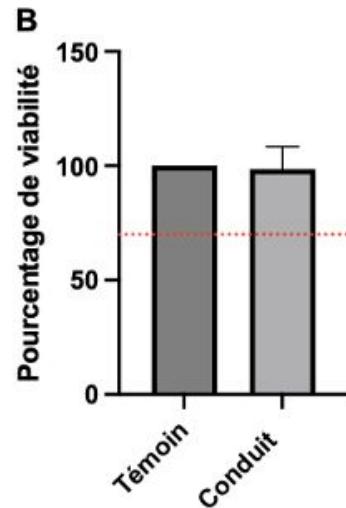


Caractérisation du conduit



Observation au MEB

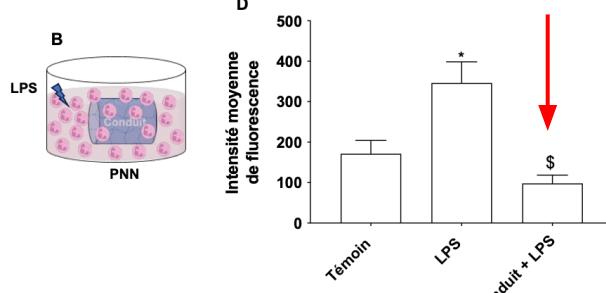
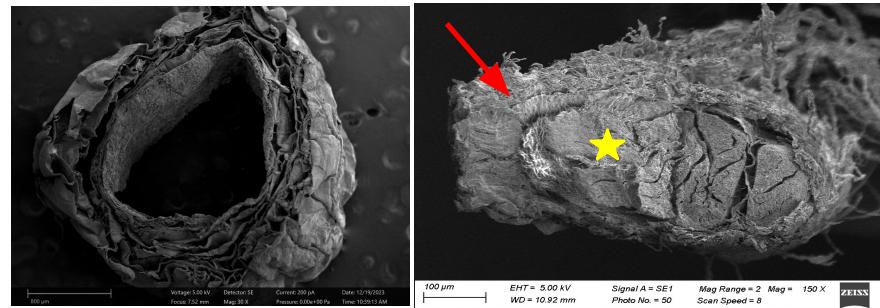
Non cytotoxique



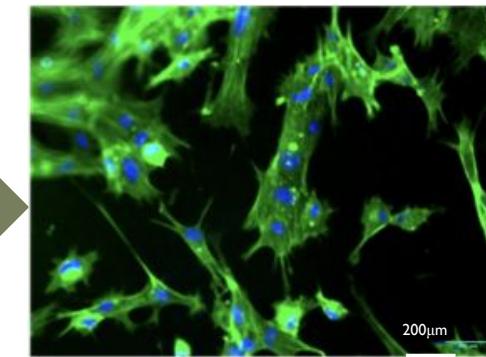
Cytotoxicité

Effet sur les PNN circulants

Régulation production ROS

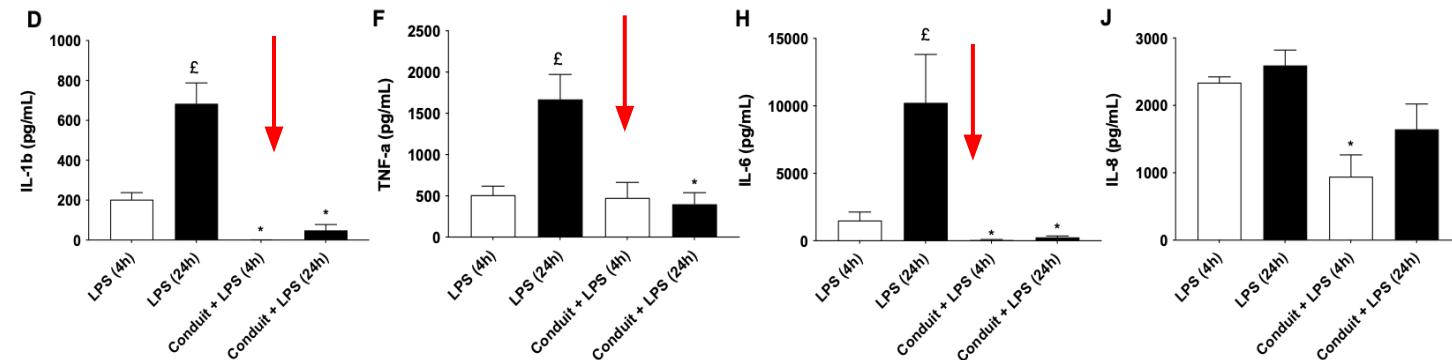
**Evaluations biologiques des conduits**

Visualisation des cellules de la périnevre dans les conduits



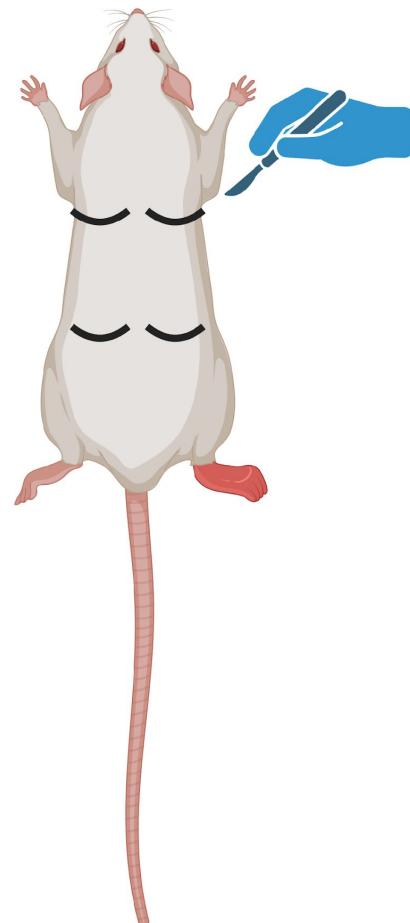
Effets sur les monocytes

Régulation production cytokiniques

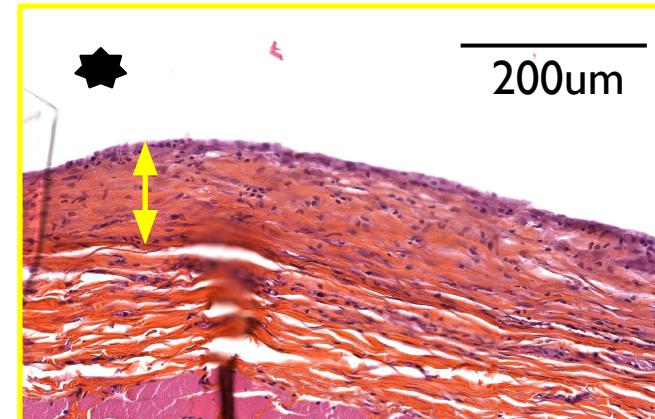


- Effet antioxydant sur les PNN
- Effet anti-inflammatoire sur les monocytes

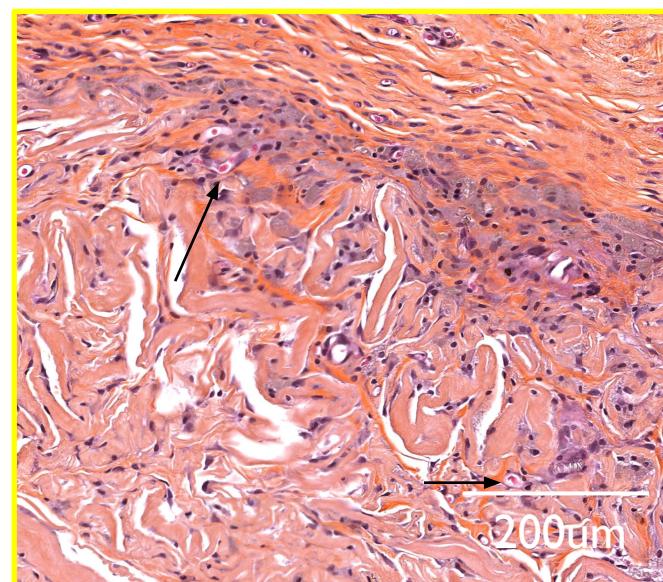
Biocompatibilité *in vivo*



Témoin silicone

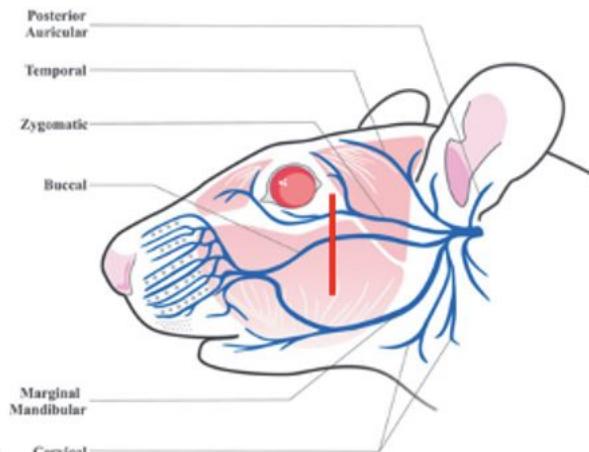
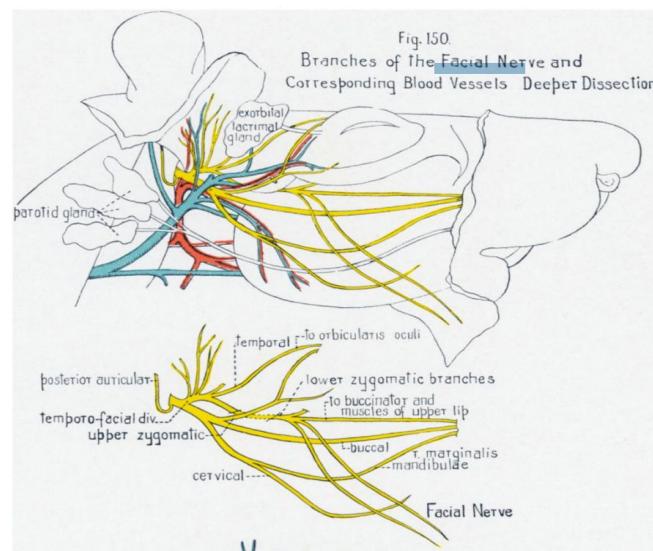
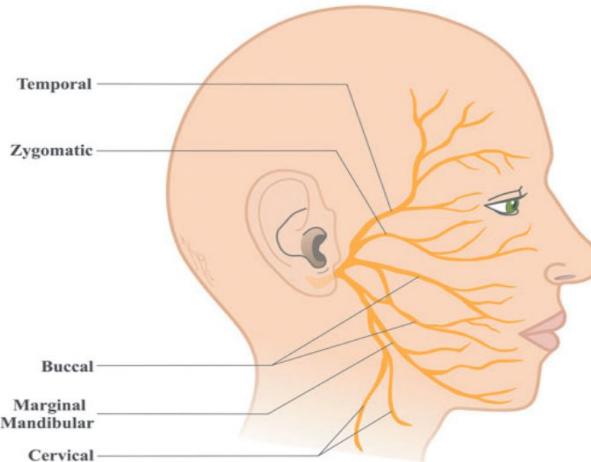


Conduit



- Réaction au corps étranger modéré
 - Biointégration
 - Migration cellulaire

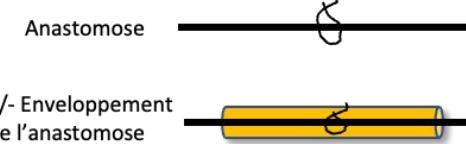
Modèle de régénération du NF chez le rat



Proximal ————— Distal
NF

4mm

12



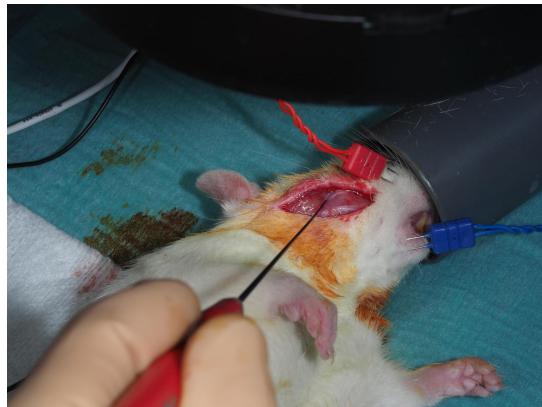
+/- Enveloppement
de l'anastomose

Section du nerf

Anastomose

Modèle de régénération du NF chez le rat

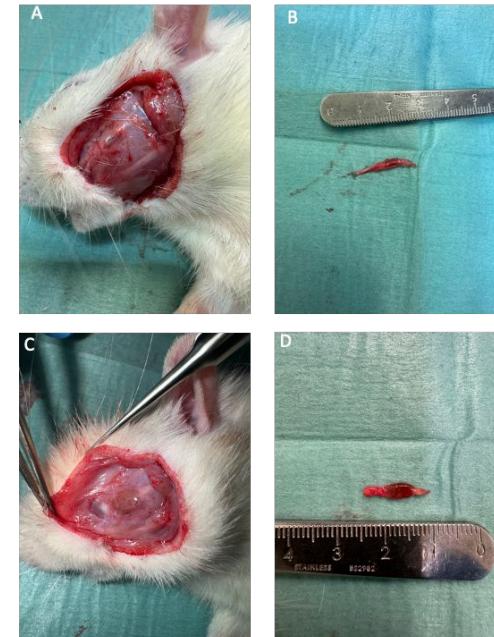
J0



Suivi clinique et score de fonction faciale hebdomadaire

	Symétrie des vibrisses au repos		Mouvement des vibrisses		Symétrie du nez au repos		Mouvement du nez	
	Droite	Gauche	Aucuns mouvements	Asymétrie	Droite	Gauche	Aucuns mouvements	Asymétrie
0	Asymétrie	Aucuns mouvements	Aucuns mouvements	Asymétrie	Aucuns mouvements	Aucuns mouvements	Asymétrie	Asymétrie
0,5	Un peu				Un peu			
1	Normal	Léger tremblements	Léger tremblements	Normal	Un peu	Un peu		
2		Mouvement effectif	Mouvements effectif		Normal	Normal		
3		Normal	Normal					

J56

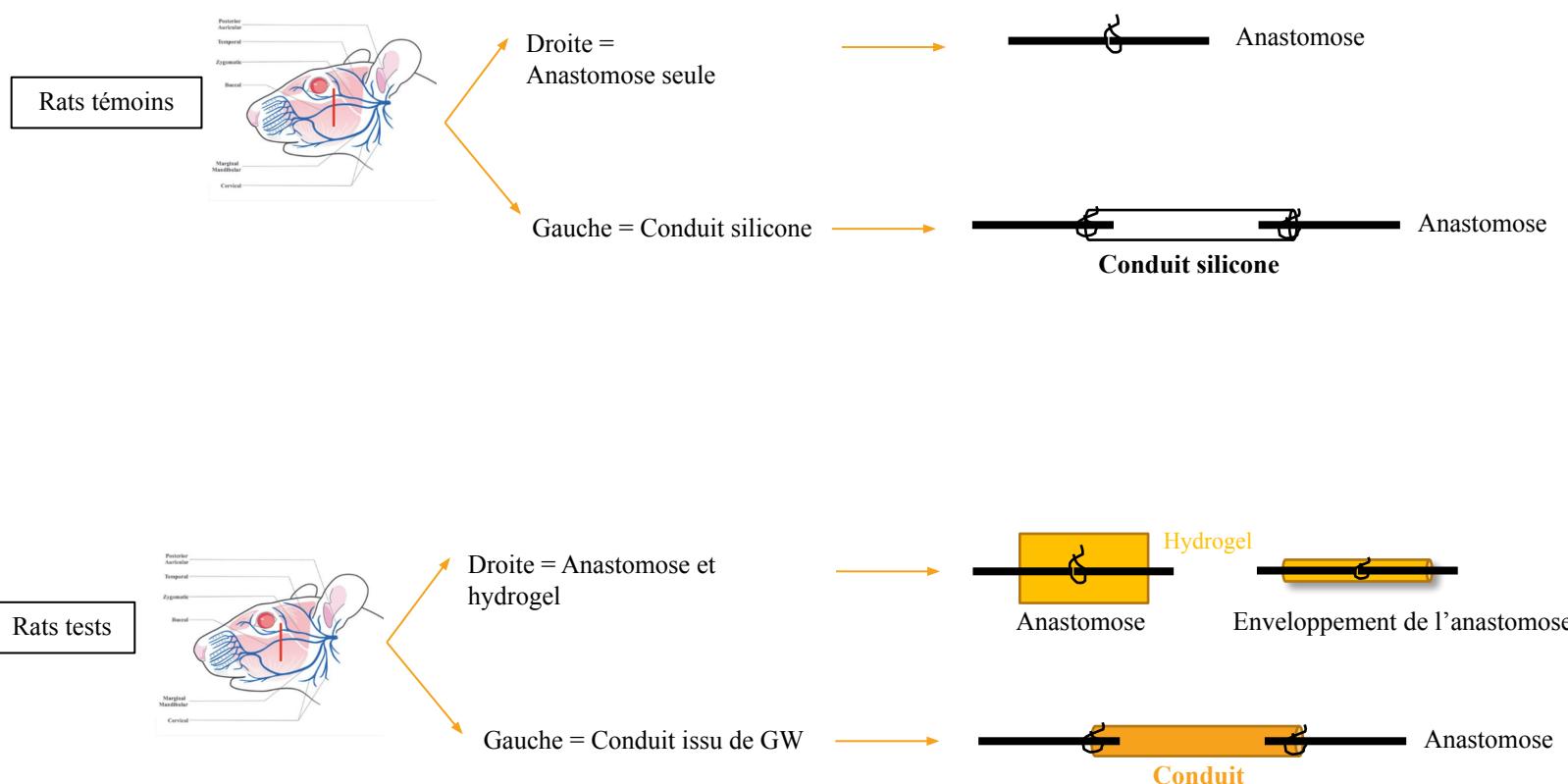


Analyses histologiques

Euthanasie

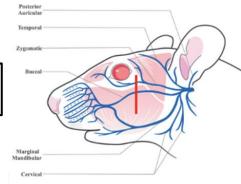
- Anesthésie générale
- ENMG du NF
- Pas de complications post opératoires

Modèle de régénération du NF chez le rat



Modèle de régénération du NF chez le rat

Rats témoins

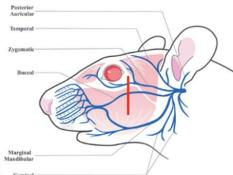


Gauche = Conduit silicone



Analyse ENMG peu concluante

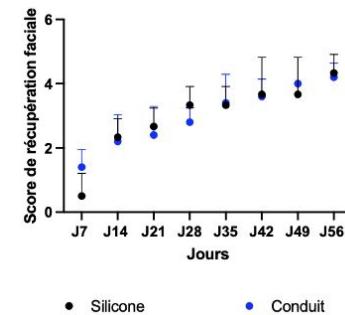
Rats tests



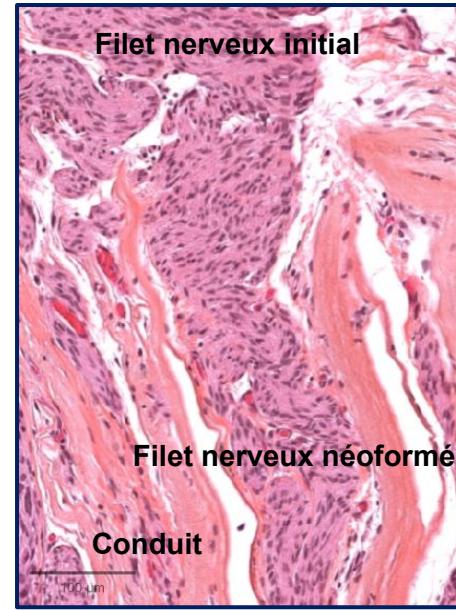
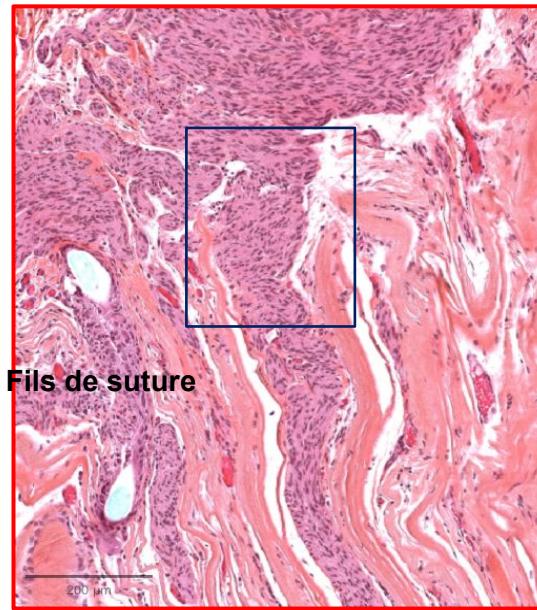
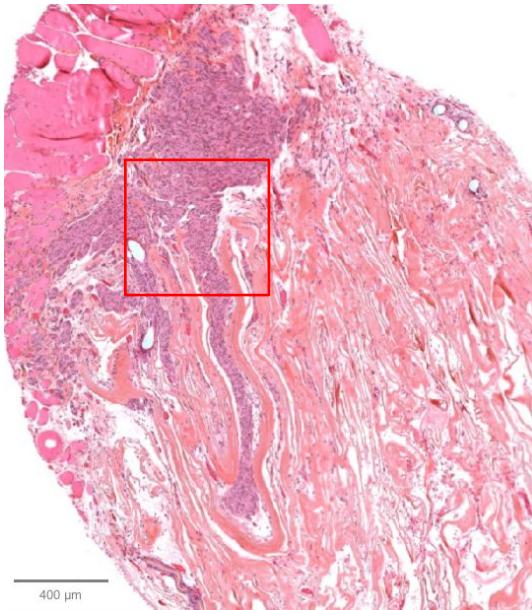
Gauche = Conduit issu de GW



Score clinique de PFP non significatif

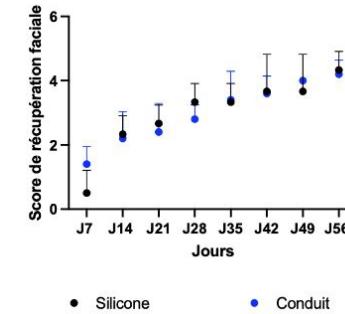


Modèle de régénération du NF chez le rat

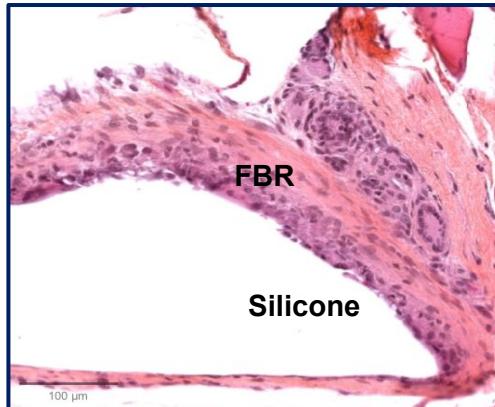
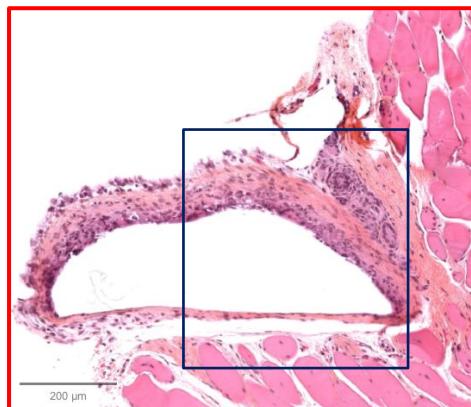


→ Analyse ENMG peu concluante

→ Score clinique de PFP non significatif



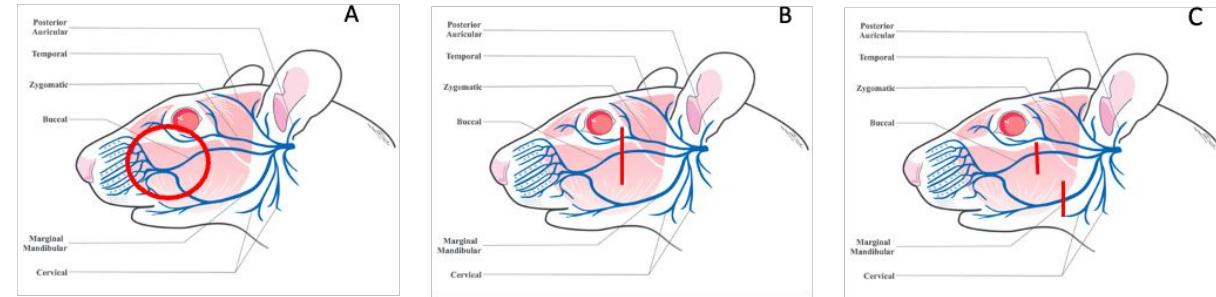
→ Analyses histologiques en faveur d'une repousse axonale



Modèle de régénération du NF chez le rat

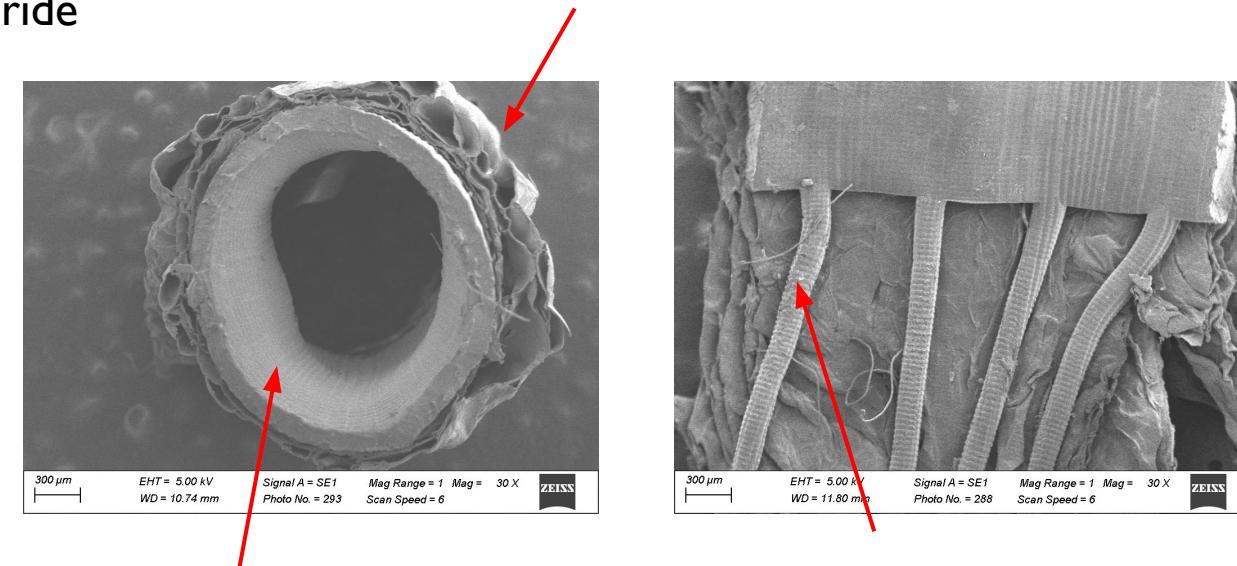
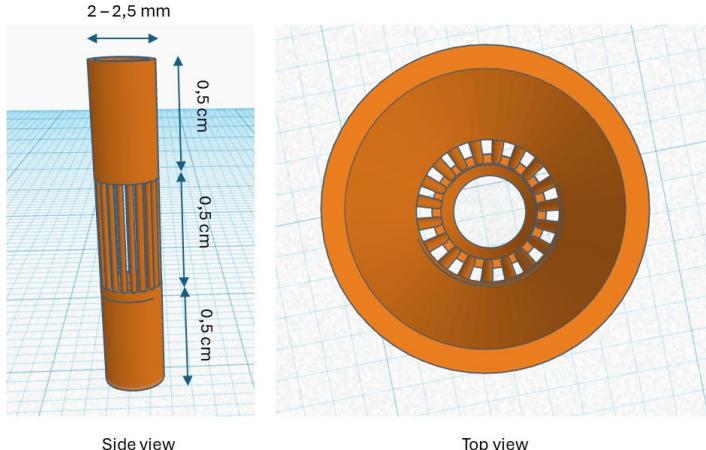
Limites du 1er modèle :

- Anastomose en aval de la section



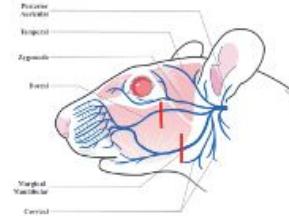
Modèle de double section

- Favoriser l'alignement axonal : stent hybride



Modèle de régénération du NF chez le rat

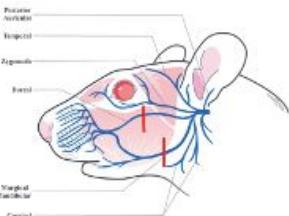
Rats témoins



Droite = Anastomose seule

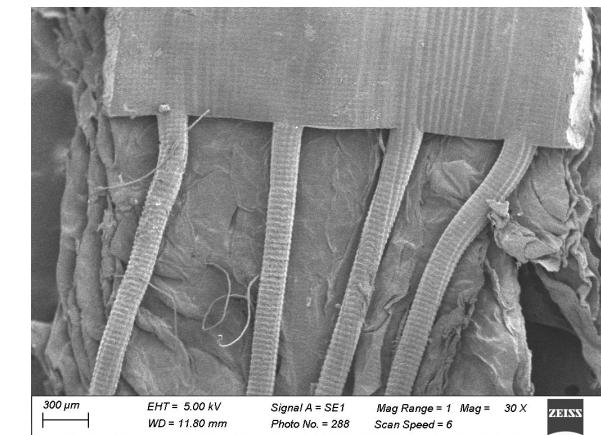
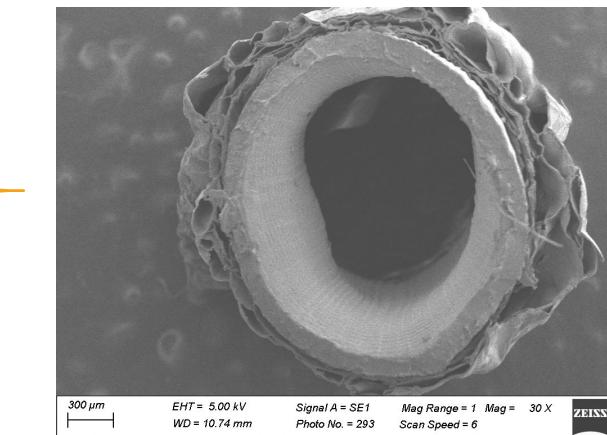
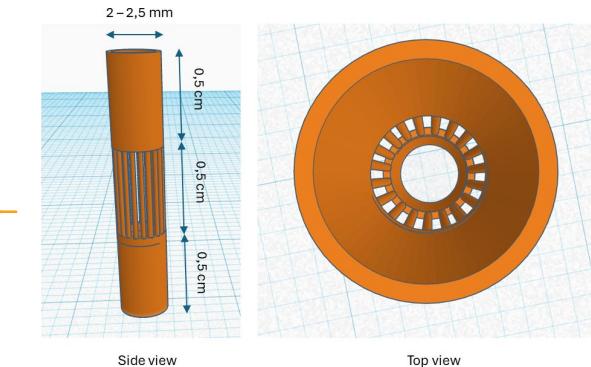
Gauche = Stent

Rats tests



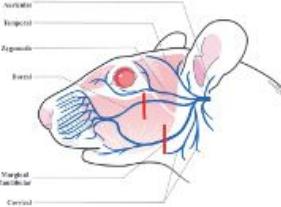
Droite = Anastomose et hydrogel

Gauche = Conduit hybride



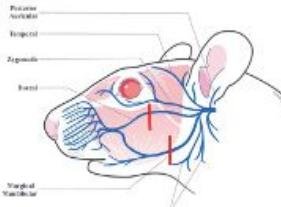
Modèle de régénération du NF chez le rat

Rats témoins

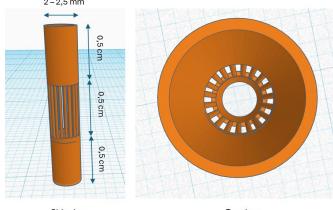


Gauche = Stent

Rats tests

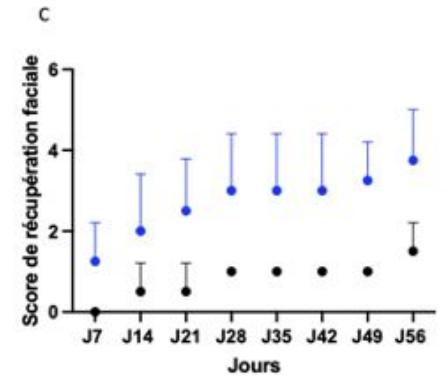


Gauche = Conduit hybride

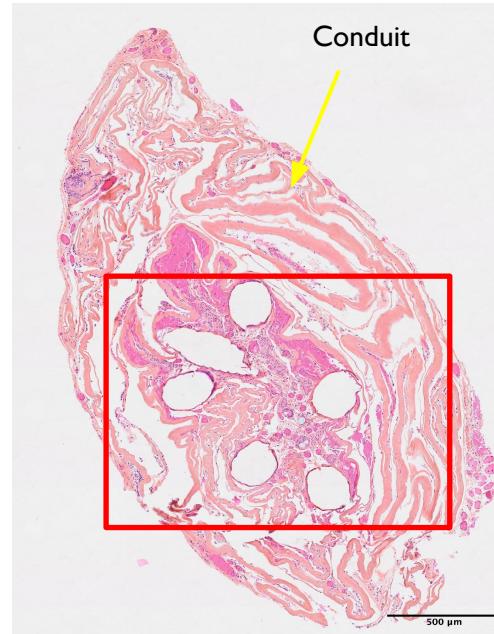
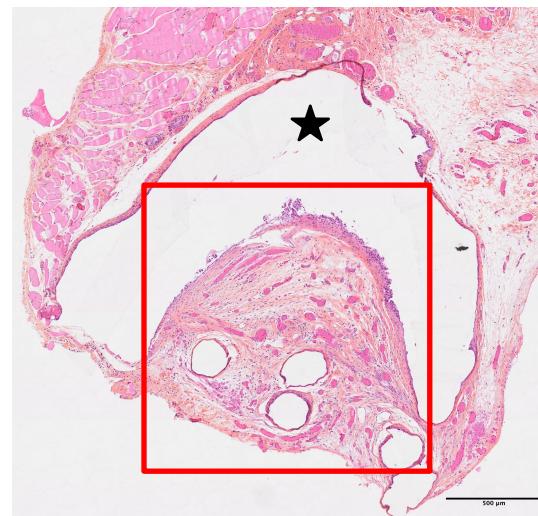


→ Analyse ENMG en cours

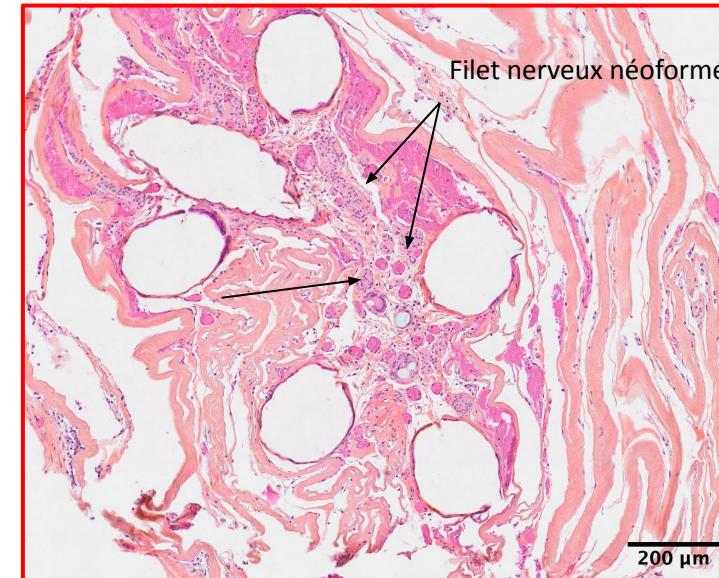
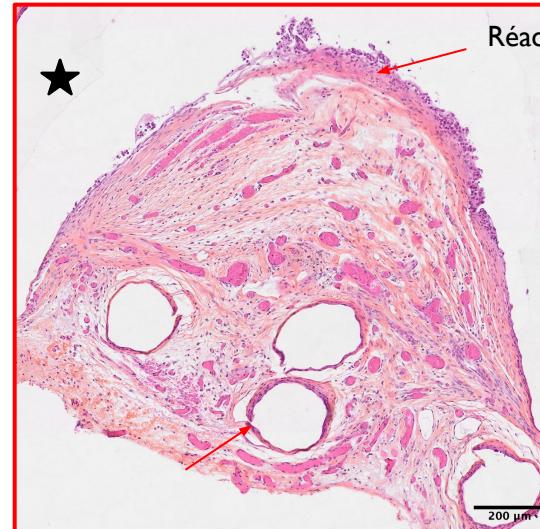
→ Score clinique de PFP statistiquement significatif



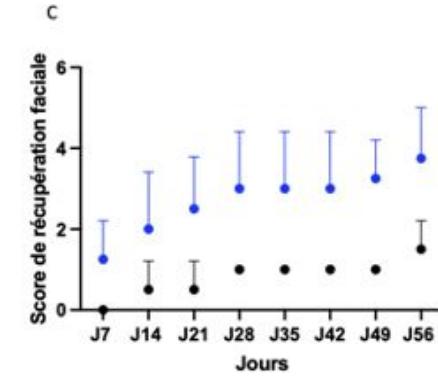
● Stent ● Conduit hybride



Modèle de régénération du NF chez le rat



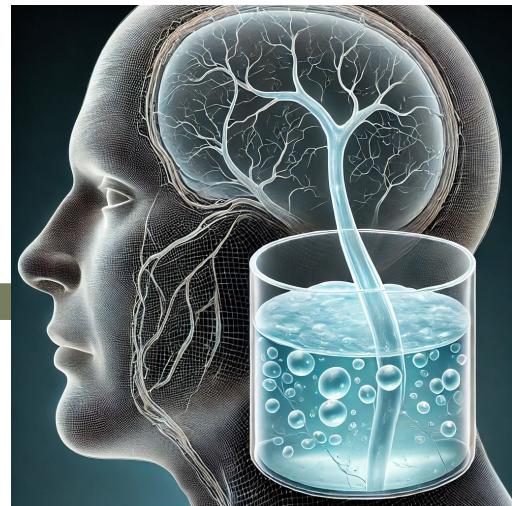
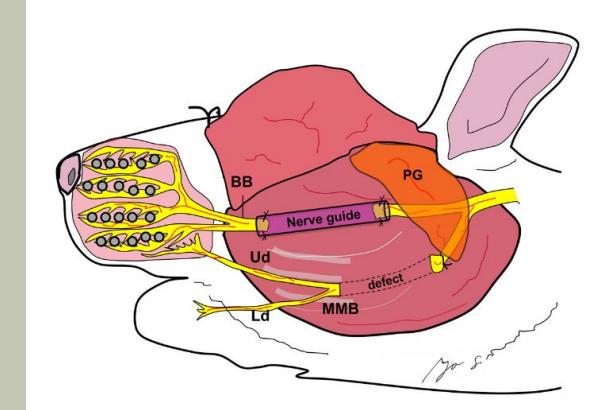
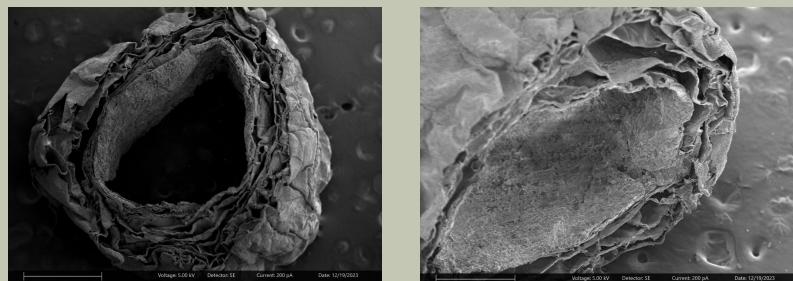
- Analyse ENMG en cours
- Score clinique de PFP statistiquement significatif



- Analyses histologiques en faveur d'une repousse axonale

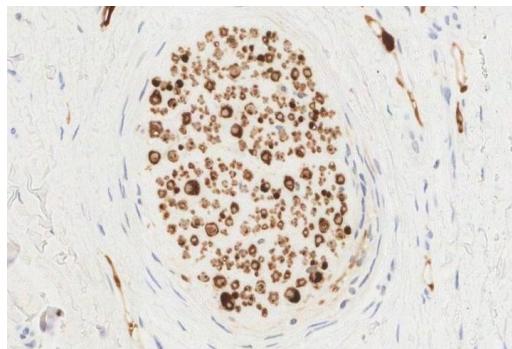
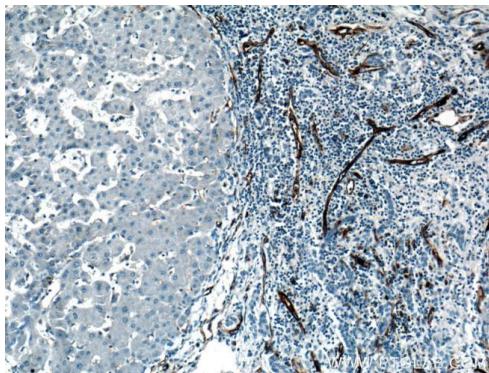
Bon substrat pour la régénération tissulaire

- Anti inflammatoire
- Anti oxydant
- Pro angiogénique
- Biocompatible

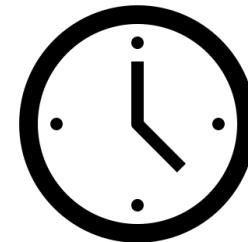
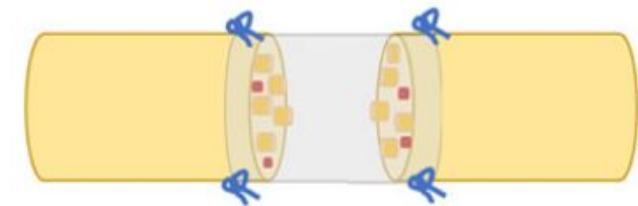
Conclusion**Modèle de défaut du nerf facial****Développement d'un conduit adaptable à la régénération nerveuse**

Conclusion**Immunomarquages**

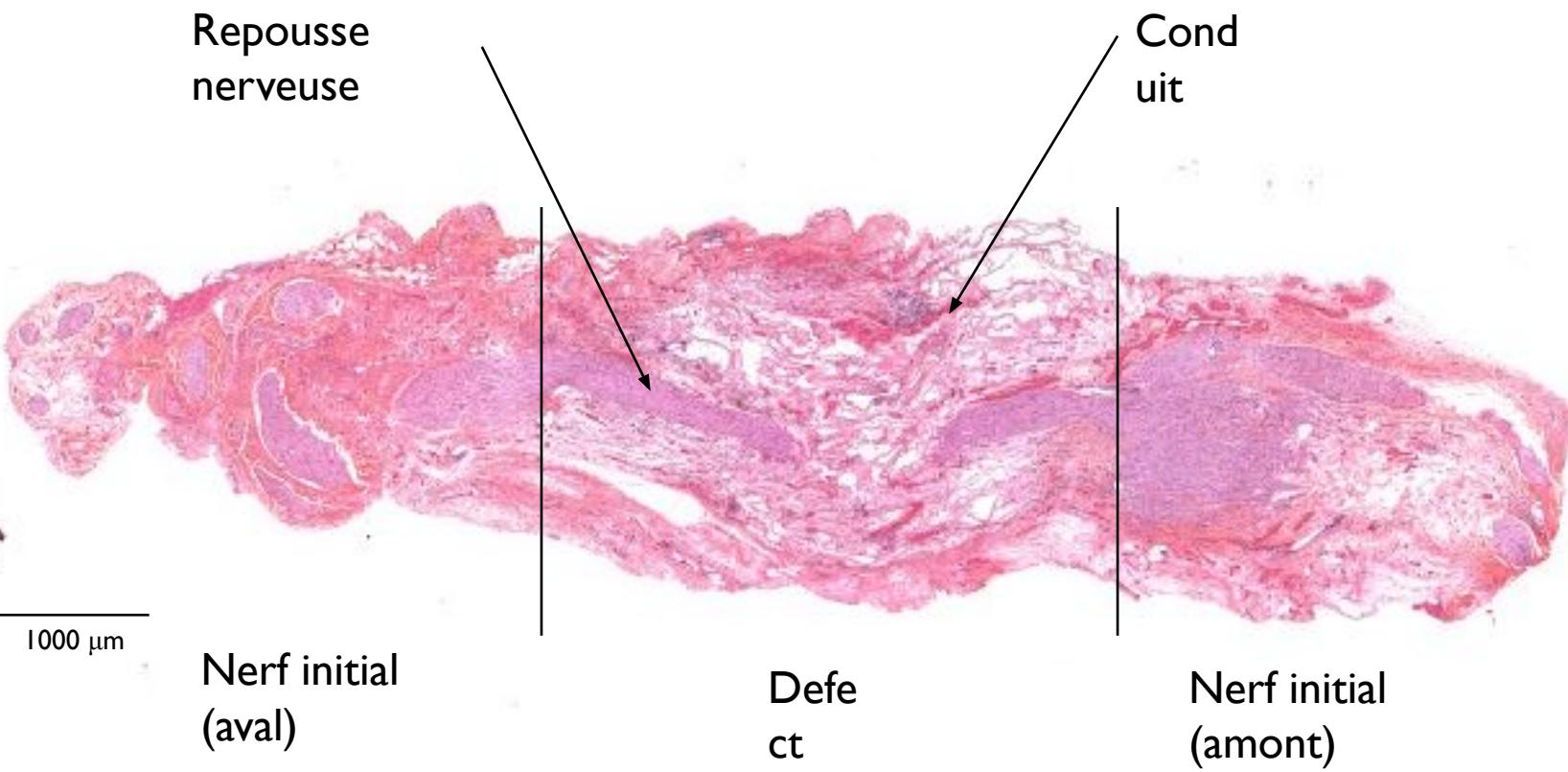
- Inflammation
- Cellules nerveuses



ET APRES ?

**Temps expérimentaux plus long****Amélioration de la structure des conduits****Amélioration des modalités d'étude du NF**

ET APRES ?



Merci pour votre attention !