

# REHABILITATION LEAFLET

for patients receiving nerve transfers  
to restore upper extremity function



CD- Laboratory  
for Bionic  
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MEDICAL UNIVERSITY  
OF VIENNA

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## for patients receiving nerve transfers to restore upper extremity function

You have been diagnosed with a peripheral nerve injury and have undergone nerve transfer surgery in order to treat this condition. This leaflet has been written to help you learn more about this condition and to explain how rehabilitation may be structured to facilitate functional recovery. It might be used by your surgeon/therapist while explaining your further treatment plan. However, due to the general nature of this leaflet, it cannot cover all specific details that may be relevant for you. Please speak to your surgeon and/or therapist if you have any questions about your condition and care.

### What are peripheral nerves? What is a nerve injury?

Your peripheral nerves are cord-like structures of tissue formed from a collection of nerve fibres. A single nerve can consist of thousands of fibres. These fibres link your brain to the rest of your body. For a muscle to work, information must travel from the brain along a nerve to the muscle. Peripheral nerves are fragile and easily damaged. A nerve injury can affect your brain's ability to communicate with your muscles and organs. Thus, when nerve fibres are injured, the muscles linked to that nerve are weakened, even though the injury is not in the muscle itself. Additionally, you may have a loss of sensation or feel tingling sensations.

### What treatment options are available after nerve injuries?

The treatment of choice depends hugely on how your nerve was injured, the severity of injury and the time elapsed since the injury. If you suffered multiple nerve injuries, a combi-

nation of the techniques listed may be applied. Please speak to your surgeon, if you want a more detailed explanation on the surgical techniques and why he/she decided to do the nerve transfers.

- In cases of mild injuries, spontaneous recovery may occur, and no surgical repair is needed. Usually, regular check-ups are needed to ensure that recovery continues to its maximum potential. Still, nerves recover slowly, and maximal recovery may take several months and even years. In these cases, usually physiotherapy is recommended to prevent stiffness and restore function.

- If a section of a nerve is cut completely or damaged beyond repair, the surgeon can remove the damaged section and reconnect healthy nerve ends. This is called nerve repair or direct nerve suture. Sometimes the surgeon needs to transplant a piece of nerve from another part of your body, if there is a gap to bridge. You would refer to this technique as a nerve graft. Both procedures can help your nerves to regrow.

- In cases of extensive and severe nerve injuries a so-called nerve transfer may be indicated. This means that your surgeon borrows another working nerve to restore the function that the injured nerve was responsible for. Sometimes this might be combined with transferring a muscle from another part of your body.

- After particularly severe nerve injuries, if the other surgical techniques do not lead to the desired result, or your condition has been untreated for a long time, your doctor may suggest surgery to restore function

to critical muscles by transferring tendons from one muscle to another. This can also be done years after the injury and primary treatment. Thus, this option might be considered, if your functional goal cannot be reached with nerve transfers and subsequent rehabilitation.

### What is the prognosis after nerve transfer surgery?

Unfortunately, it is nearly impossible to give you a prognosis of the long-term outcome shortly after nerve transfer surgery. Many factors influence the outcome after nerve injuries and subsequent nerve transfers. This implies that other people you may meet (or read about) who had a nerve injury as well could have a completely different long-term outcome than you.

After the surgery, your nerve needs to “grow” into the new muscle (or skin), which takes a lot of time. Thus, it is completely normal that you will not have any gain in function in the first months after the surgery. Your clinical team will regularly check your muscle activity and let you know as soon as they see voluntary muscle activity. After that you will slowly gain more control over your muscle activation and there will be an increase in strength over time. Usually, sensory function improves over time as well. However, within the first year after nerve injury, it is not possible to predict if you will have a full functional

recovery or if impairments will remain after the rehabilitation process.

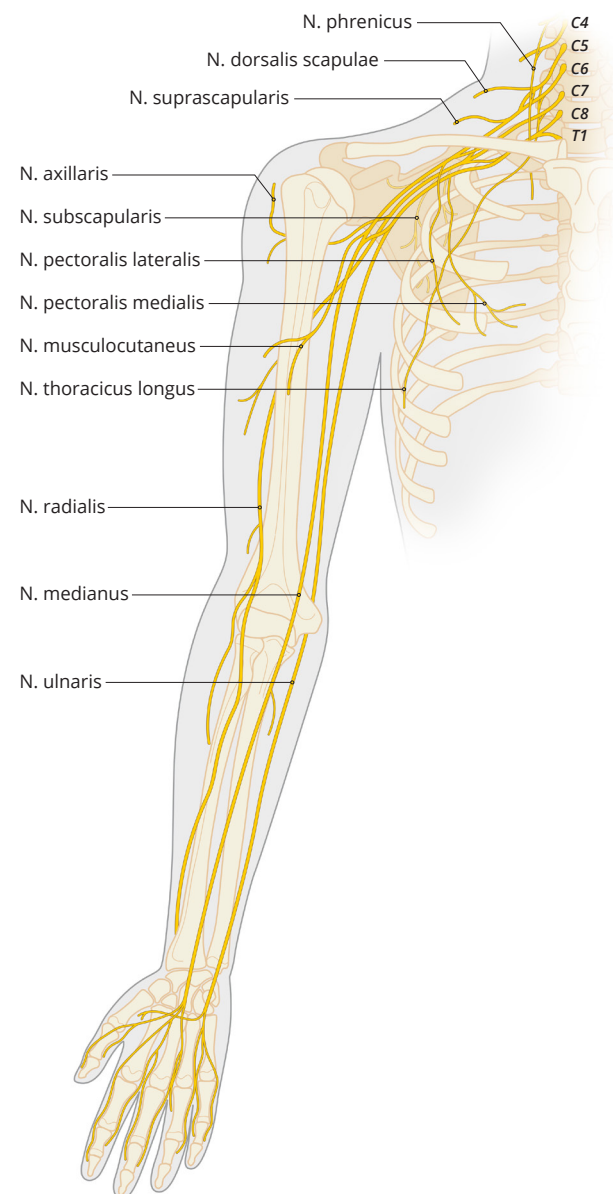
### How do the nerve transfers affect my rehabilitation plan?

As the nerves take a while to “grow” into the new muscle after the nerve transfers, the first part of the rehabilitation plan is designed to guide you through the phase where you will not be able to actively move your arm/hand.

As soon as the nerve has reached its target, therapy will focus on activating the muscle that was previously paralyzed. Nerve transfers work by borrowing parts of an intact nerve. As these intact nerve fibres have been used to control a different muscle before they were transferred, you will be able to activate them by thinking about a movement their original muscle is usually responsible for. Your surgeon/therapist might use the following anatomy chart and table to explain the nerve transfers that were done and what this means for you. Within rehabilitation, the goal is to strengthen the previously paralyzed muscles and to support your brain in learning to use the transferred nerve fibres for their new function. Additionally, therapy will support you to get a better sensitivity and should help to reduce strange sensations and pain over time. Again, all of this will take a relatively long time. However, you can actively support this process by following the home exercise program that your therapist has discussed with you.

## Nerves of the upper extremity

Your surgeon/therapist might use this to explain your injuries and the nerve transfers.



## Your nerve transfers

Your surgeon/therapist might use this table to indicate your surgical treatment and its implications for rehabilitation.

Injured nerve	Transferred nerve to restore the injured nerve's function	What does that mean for you?

Additional surgical details/comments:

## Your home exercises

In order to maximise the outcome after the nerve transfer surgery, your active participation in therapy and home exercises is needed. This plan will be updated over time.

## Suggested reading

If you are interested in some scientific publications about the topic, you might want to have a look at:

- Novak CB. Rehabilitation Following Motor Nerve Transfers. *Hand Clinics*. 2008;24(4):417–423.
- Kahn LC, Moore AM. Donor Activation Focused Rehabilitation Approach: Maximizing Outcomes After Nerve Transfers. *Hand Clin*. 2016;32(2):263-277.
- Sturma A, Hruba LA, Prahm C, Mayer JA, Aszmann OC. Rehabilitation of Upper Extremity Nerve Injuries Using Surface EMG Biofeedback: Protocols for Clinical Application. *Frontiers in neuroscience*. 2018;12(906).

## Additional notes

## Contact details

Please get in touch with us, if you have any questions.

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