



## Guideline for Surgeons

**Rehabilitation guidelines**  
*following Hyalofast® implantation for the  
treatment of knee cartilage defects*

FH-Prof. Barbara Wondrasch, PhD

# Hyalofast®

Hyalofast is a biodegradable hyaluronan based (HYAFF®) scaffold for one-step surgical treatment of chondral and osteochondral defects.

It acts as a support for mesenchymal stem cells (MSC) from bone marrow aspirate or as a chondroprotective coverage which favours in situ residence of MSCs after their mobilization due to micro fracture or perforation procedures.

Hyalofast guides tissue remodelling and promotes the healing of cartilage tissue through the action of the MSCs which have populated the scaffold.

Hyalofast is applied in the cartilage defect via arthroscopy, or mini-arthrotomy.

Proper rehabilitation is of the utmost importance to the success of the treatment. Care should be aimed at protecting the joint surface while the cartilage heals and it should be customised in terms of intensity and difficulty, according to individual clinical conditions.

*For more information visit:*  
[hyalofast.anikatherapeutics.com](http://hyalofast.anikatherapeutics.com)



# Rehabilitation starts before surgery: the importance of prehabilitation

To ensure a good post-operative outcome, patients should participate in a **prehabilitation program** before undergoing surgery. This helps to **prepare** the patient **mentally** and **physically** for the post-operative phase.

Content of the prehabilitation program is to teach the pa-

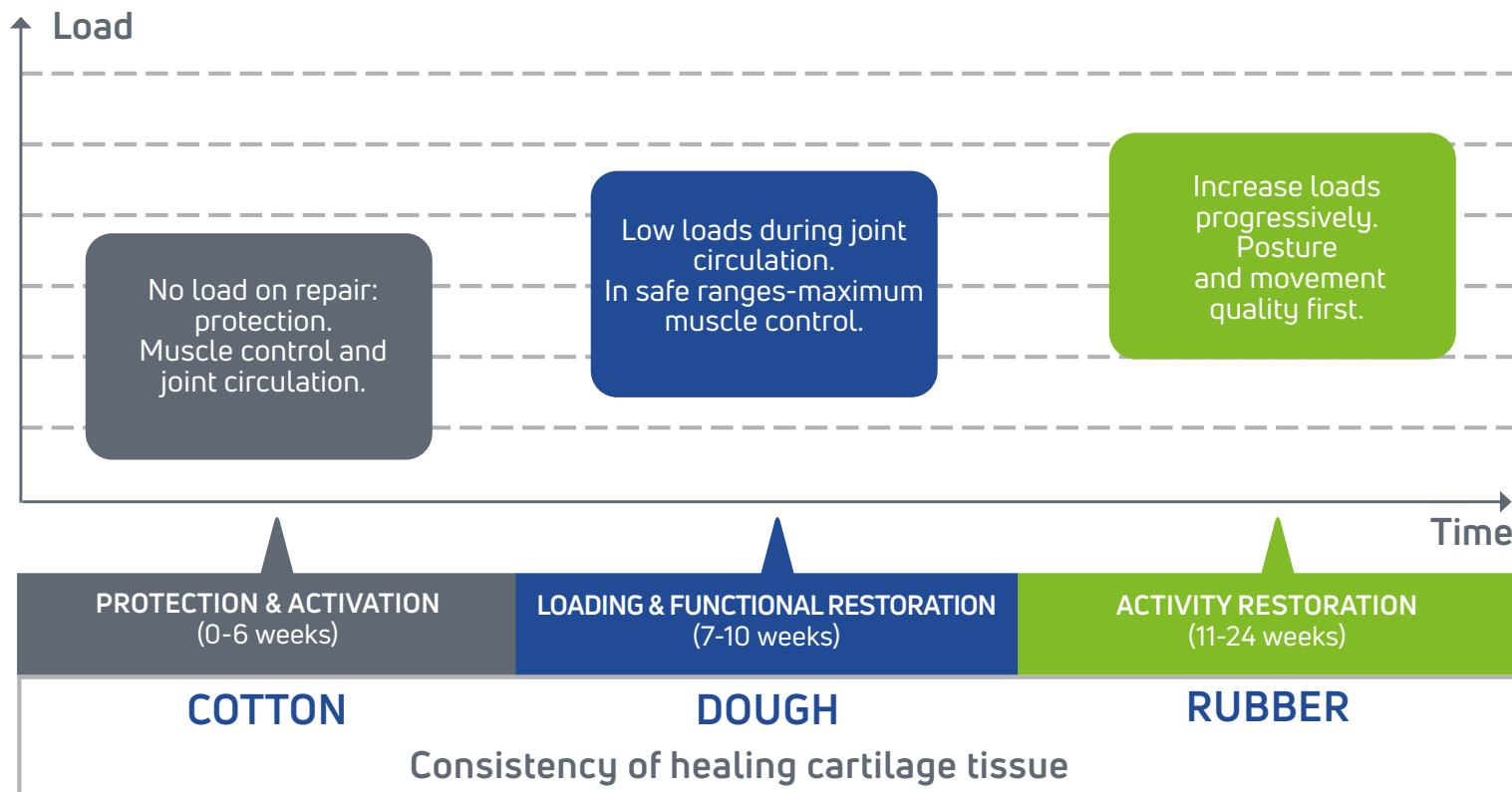
tient how to use crutches and how to practice the exercises that should be performed immediately after surgery. Furthermore, you get an idea of the readiness and willingness to comply with the challenging postoperative rehabilitation and restrictions.



# Tissue healing and rehabilitation

Rehabilitation after cartilage repair is characterised by three different phases that are based on the biological healing process of the damaged tissue: 1) **Protection and activation phase** 2) **Loading and functional restoration phase** 3) **Activity restoration phase**

## Phases of rehabilitation and biological healing phases





# Tissue healing and rehabilitation



The first phase, **protection** and **activation**, is characterised by the formation of a blood clot and dense fibrin network which becomes organised into a primitive glue.

During the second phase, **loading** and **functional restoration**, matrix production is at its peak of organisation of the collagen fibers. The focus of the third phase, **activity restoration**, is maturation and adaptation of the regenerating tissue.

The main components of rehabilitation, weight-bearing (WB), range of motion (ROM) and neuromuscular training, are adapted to the current load bearing capacity of the healing tissue while respecting joint homeostasis.

So, rehabilitation modalities and the progression through the rehabilitation program, must be designed respecting the physiological development of the regenerating tissue.

Progression through the rehabilitation phases should be based on specific criteria rather than on fixed timelines. Since pain and effusion are the best indicators of a possible joint overloading during the healing process, they can be used as guide through the rehabilitation program progression.

# PHASE 1 (WEEK 0-6)

## Protection and Activation Phase

		WB	ROM	NMT
Tibiofemoral joint (TFJ)	WEEK 0-2	Toe-touch WB 20% BW	Passive and active ROM 0°-30°	<ul style="list-style-type: none"> <li>- Isometric activation of the lower limb muscles with focus on knee and hip muscles</li> <li>- Concentric exercises in partial weight bearing positions for hip and knee muscles</li> <li>- Concentric exercises in full weight bearing positions for hip and knee muscles</li> </ul>
	WEEK 2-4	Partial WB 50% BW	Active and passive ROM 0°-90°	
	WEEK 4-6	Increase to full WB	Controlled progression to free ROM	
Patellofemoral joint (PFJ)	WEEK 0-2	Toe-touch WB 20% -30% BW with a brace locked in extension	Active and passive ROM 0°-20°	
	WEEK 2-4	Increase to full WB with a brace locked in extension	Active ROM 0°-40°, passive ROM 0°-60°	
	WEEK 4-6		Active ROM 0°-60°, passive ROM 0°-90°, then controlled progression to free ROM	

WB: Weight Bearing; ROM: Range of Motion;  
 NMT: Neuromuscular Training; BW: Body Weight

### AIMS

1. Pain-free and minimisation of effusion
2. Full active and passive knee extension
3. Active and passive knee flexion minimum 110°
4. Progression to weight-bearing, two-legged activities
5. Neuromuscular control of Quadriceps and Hamstrings

### Progression criteria to full weight-bearing

- Full active extension in weight-bearing positions
- Full active and passive knee extension
- No pain and effusion after long periods of walking (> 20 minutes)
- If pain and effusion increase, reduce weight-bearing activity
- No feeling of instability
- No limping mechanism

## PHASE 2 (WEEK 7-10)

### Loading and functional restoration

#### AIMS

1. Movement without ambulatory devices
2. Physiological gait pattern – no limping mechanism
3. Restoration of ADL's

	Tibiofemoral joint	Patellofemoral joint
<b>WEIGHT BEARING</b>	Full WB during ADL's No pain and no effusion	Full WB during ADL's No pain and no effusion
<b>RANGE OF MOTION</b>	FROM implementation in ADL's	FROM implementation in ADL's

ADL's: Activities of daily living; FROM: Free range of motion



Walking phase "loading response" whilst lying on the side.  
Activation of the gait phase specific muscle with reduced load within the TFJ.



# PHASE 3 (WEEK 11-24)

## Activity restoration

### AIMS

1. Return to work
2. Resume all normal functionality
3. Return to low-impact recreational activities (after 12 weeks)
4. Return to high-impact activities (after 24 weeks)

	Tibiofemoral joint	Patellofemoral joint
<b>WEIGHT BEARING</b>	Full WB during ADL's and low impact activities No pain and no effusion	Full WB during ADL's and low impact activities No pain and no effusion
<b>RANGE OF MOTION</b>	FROM implementation in ADL's and low impact activities	FROM implementation in ADL's and low impact activities

FROM: Free range of motion



Instruction with external focus



# DETAILS ON RETURN TO SPORT ACTIVITIES

In course of the third phase of rehabilitation almost all leisure and sport activities can gradually be resumed - first low impact activities and later, high impact sports. However, it is mandatory before resuming such activities, the following criteria are fulfilled:

- Free range of motion
- Good muscular control (to be assessed by the physiotherapist)
- No pain and effusion during walking and ADL's
- Ability to stand on one leg and keep a good lower limb alignment for 30 seconds. (to be assessed by the physiotherapist)

Generally, low impact sports can be resumed after 12 weeks, while high impact activities after 24 weeks. However, the final timing is highly subjective and can vary from patient to patient.

## Low impact sports (after week 12):

- Cycling
- Swimming
- Rowing
- Hiking
- Cross-country skiing
- Water aerobics
- Running (slow mode)

## High impact sports (after week 24):

- Soccer
- Baseball
- American Football
- Basketball (Volleyball, Handball)
- Tennis (Squash, Badminton)
- Mountain Biking
- Skiing
- Athletics

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Barbara Wondrasch has been a physiotherapist since 1996 and a sports physiotherapist since 1999. The focus of her clinical practice is within the field of traumatology, orthopedics and sports medicine. In 2001 she started her research activities in the “Center for Joints and Cartilage” of the Medical University of Vienna. The aim of this center was to develop evidence-based surgical and non-surgical treatment options for patients with focal cartilage lesions in the lower extremity. After getting her master’s degree in “Evidence-based Physiotherapy” (MSc) at the University of Applied Sciences in Vienna, she started her PhD-studies at the Norwegian School of Sports Sciences in Oslo (Supervisor: Prof. May Arna Risberg). She finished the studies in 2015 and the title of her dissertation was “Rehabilitation for patients with focal articular cartilage lesions in the knee”.

Currently Barbara Wondrasch is working as a researcher and lecturer at the Department for Health Sciences at the St.Poelten University for Applied Sciences in Austria. She has several publications in peer-reviewed international journals and gives regular presentations and lectures at national and international conferences. The main topics of her scientific work are prehabilitation and rehabilitation for patients with osteoarthritis and cartilage injuries, outcomes of rehabilitation and prevention of musculoskeletal disorders.



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