

BIOTECH
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Guideline for Patients

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

FH-Prof. Barbara Wondrasch, PhD

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Introduction



As you have a cartilage defect in your knee with problems such as pain, swelling, and perhaps feeling that you can't use your knee as you want to, your surgeon has recommended a repair of the defect using Hyalofast.

Hyalofast is a hyaluronic acid-based scaffold that is placed inside your cartilage defect and will support your own stem cells to naturally re-build your cartilage. Stem cells can be added to the scaffold by one of two techniques.

The first technique is called microfracture or nanofracture and consists of creating a few small holes in the surface of the bone at the base of the cartilage defect. This makes your bone "bleed" a little from the bone marrow under the surface of the bone and this blood contains your stem cells. Hyalofast is then applied over the bleeding bone and the blood and stem cells seep into the Hyalofast where they become trapped within the scaffold.

The second technique is called BMAC, which stands for Bone Marrow Aspirate Concentrate. This consists of aspirating

some bone marrow from your hip bone and then putting it into a centrifuge which spins at high speed to separate out the stem cells from the rest of the bone marrow. The cells are then loaded onto the Hyalofast scaffold before it is placed inside your cartilage defect.

Whichever technique is used, the stem cells organize themselves within the scaffold and multiply, effectively regenerating new cartilage over a period of time. As this is happening, the Hyalofast scaffold will be naturally resorbed by the body.

The scaffold containing the growing number of cells is very sensitive to load bearing for some time after surgery and therefore it is important that you strictly follow the postoperative rehabilitation protocol tailored for this kind of procedure as this will ensure you fully recover and regain joint function as soon as possible.

The goals of the rehabilitation protocol are to reduce pain and swelling, (which are normal after surgery), to re-

establish joint motion and to regain strength of the muscles supporting your knee movements. These aspects are essential to regain good joint function and will bring you back to your normal activities of daily living, to your job and to your sporting activities.

The surgical procedure will only take a few hours, but the rehabilitation process will take several months. It is very important to have this clearly in mind. The rehabilitation programme should start before surgery – it is the so-called pre-habilitation. This is where your physiotherapist can help you prepare mentally and physically before surgery and you will be taught how to use crutches and gain some insight into the exercises and programme you will follow post-operatively, understanding what is good for your knee and what is less good.

Key points of rehabilitation after Hyalofast surgery



Protect the healing cartilage

1. In the first 4 postoperative weeks, the healing cartilage is very sensitive to load, or weight and has to be protected from overloading. The easiest way to protect the healing cartilage would be to put a cast around your knee and keep it completely unloaded using crutches. However, to ensure that your cartilage gets stronger and let it mature, it needs to be properly stimulated – this won't happen with a cast around your knee and a long period of unloading. The job of your physiotherapist will be to provide the right stimulation, teaching you to find the proper balance between protecting the healing cartilage and stimulating it at the same time.



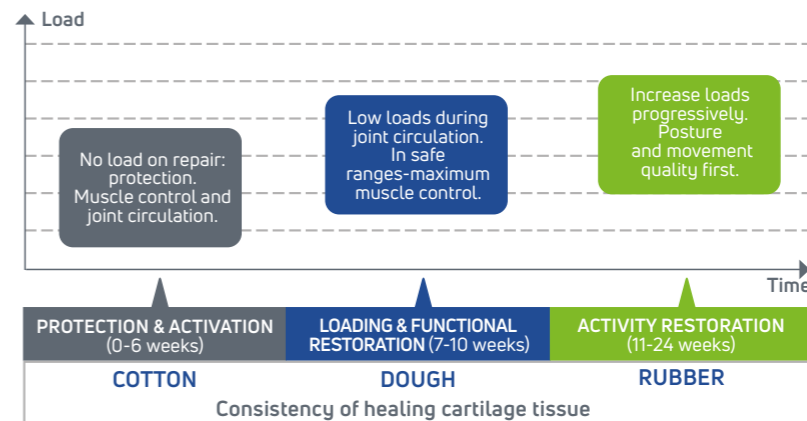
Induce functional repair of the tissue

2. Beside protecting the healing cartilage tissue, a good joint function is essential for activities of daily living and sport activities. Good joint function means that you have sufficient range of motion, good strength of your lower limb muscles and good coordinative skills. This can be achieved by specific passive treatment modalities and active exercises. The exercises will be safe and will start at a low level of loading. With time, the load and complexity of the exercises will increase progressively and will be individualized to your needs and demands. Together with your physiotherapist you will create an individualized exercise programme that helps you to achieve your goals.

Rehabilitation phases

Generally, the rehabilitation after cartilage repair is characterized 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



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 cartilage, whilst respecting joint homeostasis (pain and swelling). To proceed from one phase to the next, you must achieve some phase-specific goals. In the table above, the timeline of the three rehabilitation phases is listed along with the goals you should reach phase by phase. Your physiotherapist will guide you through this process explaining the step by step modalities for each phase.

PHASE 1 (WEEK 0-6)

Protection and activation phase

Aims

1. To be free of pain and swelling, although a little pain and swelling may arise while being active
2. To be able to fully straighten your knee or at least to the same degree as the other knee. This is important as walking without perfect extension (also known as limping) is bad for your knee.
3. To be able to bend your knee as much as possible without pain.
4. To gradually put more weight through your leg, rely less on your crutches and start walking more naturally. There is no defined timepoint of when you can put away your crutches, but when you are free of pain and swelling and you can move your knee to the same degree as the other knee, you may then start to walk without crutches at least for short distances. On average this is possible after 6 weeks.
5. To activate your muscles around your knee. This means that you are able to consciously activate the quadriceps and hamstrings muscles in different positions such as lying flat, sitting or standing.

Timeline for Weight-Bearing and Range of Motion increase

In Phase 1 it is very important that you gradually increase weight bearing activities starting from complete unloading using crutches and putting progressively more weight through your leg within the first 6 weeks until reaching full weight bearing. The same goes for the increase in range of motion and particularly if you have a defect in the patellofemoral joint. Your surgeon or physiotherapist can tell you exactly where your defect is.

The following two tables (Table 1 and Table 2) present the timeline for the progressive increase of weight-bearing (meaning how long you should use crutches) and the progressive increase of range of motion of your knee.

It is very important to state that these are just standard values and there are several criteria which must be met before increasing load or increasing the range of motion. Your physiotherapist will explain these criteria and will prepare you optimally before moving on to the next steps.



Table 1:
Guideline for weight-bearing increase

	Tibiofemoral joint	Patellofemoral joint
WEEK 0-2	Toe-touch WB 20% BW	Toe-touch WB 20% -30% BW with a brace locked in extension
WEEK 2-4	Partial WB 50% BW	Increase to full WB with a brace locked in extension
WEEK 4-6	Increase to full WB if possible, dependent on pain and swelling. If pain and swelling are increasing – reduce weight-bearing activities.	

BW: body weight, WB: Weight-bearing

Table 2:
Guideline for range of motion increase

	Tibiofemoral joint	Patellofemoral joint
WEEK 0-2	Passive and active ROM 0°-30°	Active and passive ROM 0°-20°
WEEK 2-4	Active and passive ROM 0°-90°	Active ROM 0°-40° passive ROM 0°-60°
WEEK 4-6	Controlled progression to free ROM	Active ROM 0°-60° passive ROM 0°-90°, then controlled progression to free ROM

ROM: Range of Motion;

PHASE 2 (WEEK 7-10)

Loading & functional restoration



Aims

1. To walk freely without your crutches over longer distances without limping and without pain and swelling. It's often a good idea in the early stages of Phase 2 to keep your crutches with you, in case your knee becomes too painful or begins to swell. This can be when you first start to walk longer distances. If you need to use public transport, having your crutches with you may help to ensure your fellow passengers are a little more cautious in their movements around you and more willing help you, or give up their seat for you if needed.
2. To be as active in your normal day to day life as you were before your surgery. So you should be able to wash and dress yourself, to move around at home without help and to do your shopping (however the shopping bag must not weigh more than 3 kilos).

PHASE 3 (WEEK 11-24)

Activity restoration



Aims

1. Return to work. Of course, this also depends upon the type of work, so please discuss this with your surgeon and your physiotherapist.
2. Resuming activities such as walking, using stairs, getting in and out a car without problems such as pain and swelling. Initially, you may feel quite nervous or weaker than usual, but this will change very quickly. Please keep your physiotherapist informed – sometimes just an adaptation of the way you are moving is necessary.
3. Return to low impact activities such as swimming, walking for longer distances, cycling, gardening and other low impact leisure activities.

RETURN TO SPORT ACTIVITIES

During the course of the third phase of rehabilitation almost all leisure and sport activities can gradually be resumed. However, the final timing is highly subjective and can vary from patient to patient.

- In general **low impact sports** (e.g cycling, swimming, rowing, hiking, etc) can be resumed **from about 12 weeks after surgery**. However this will be possible only when you will meet specific criteria to be evaluated by your physiotherapist.
- Return to **high impact sports** (e.g soccer, football, basket, etc) is in general possible **from about 24 weeks after surgery**. However before resuming such activities you must complete a sport/activity specific functional progression programme in a protective environment. This program gradually duplicates all the movements of the sport/activity on a level-by-level progression. If pain and swelling occurs during this phase you should return to the activity level you were at before these symptoms

occurred. Then you will again work to proceed to the next level. This happens quite often and is nothing to worry about. It doesn't mean that anything has gone wrong with your knee either. It is just a signal from your body not to proceed too fast. You will be always guided and supported by your physiotherapist through this process.

RECOMENDATION

When you first get in touch with your physiotherapist, please inform him/her that the complete and detailed rehabilitation program for your recovery after Hyalofast surgery, is available in the Hyalofast Website:

hyalofast.anikatherapeutics.com

Your physiotherapist can easily download the Rehab Program from the website and use it as step by step guide to drive you properly through the pathway of your complete recovery.



For more information visit:
www.biotechpromed.com



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