Hip & Knee Concept

Introduction

The HUR hip and knee concept is designed to be used as a therapeutic modality in several hip and knee based disorders using the HUR's Natural Transmission method.

The Natural Transmission Method is a resistance strength training method based on pneumatic technology. The method allows for resistance to be adapted in response to the muscle's own force production, regardless of the speed of movement. An intelligent technology system for automated reporting, close to zero starting load, 100 g/1 kg increments in resistance, range limiters and additional support with connected outcome measures to document the effectiveness, enables the user to start rehabilitation early and safely, whatever the hip or knee disability.

The HUR hip and knee concept helps the rehabilitation professional to provide best practice of exercise-as-medicine, based on the latest international treatment guidelines, enabling the earliest return to daily life and activity.

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Hip and knee concept: Background and overview

Osteoarthritis (OA) is the most common chronic condition of the joints, and occurs most often in hips and knees. Degenerative diseases of the joints have become the primary cause of pain and reduced healthrelated quality of life, especially in senior population.

Knee injuries may be caused by e.g. abnormal twisting or bending of the knee or falling on the knee, for example during sports. Professional athletes who sustain knee injuries often require surgical treatment to restore the stability of the knee.

There is a clear consensus that controlled regular daily physical activity and exercise training are major contributing factors in prevention, treatment and

rehabilitation. Initial treatment should aim to restore range of movement with reasonable loading, and within the initial pain tolerance. Patience is essential since physiological changes are slow, and an individually tailored exercise training program is essential to the healing process.The duration of an exercise training intervention could be three months with an ongoing program afterwards.

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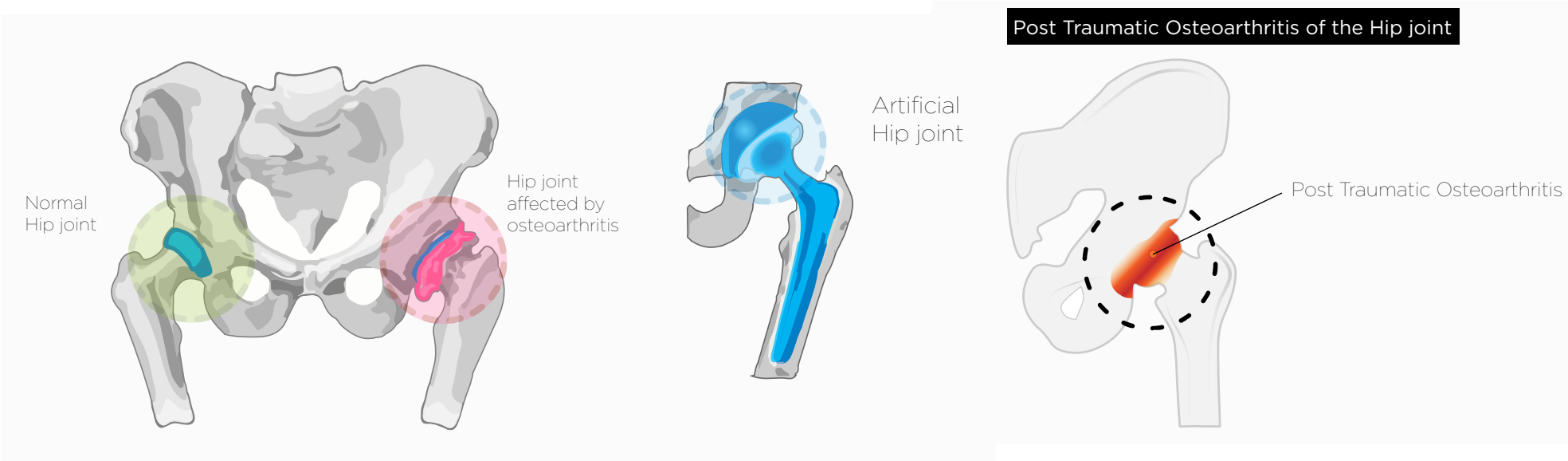
Degenerative joint diseases

Osteoarthritis (OA), sometimes called Degenerative joint disease or Degenerative arthritis, is the most common chronic condition of the joints, and occurs most often in hips and knees.

Among adults 60 years or older, the prevalence of symptomatic knee OA is approximately 10% in men and 13% in women, and the number of people affected with symptomatic OA is likely to increase due to the aging of the population and the obesity epidemic. OA is also the most common reason for total hip and total knee replacement.

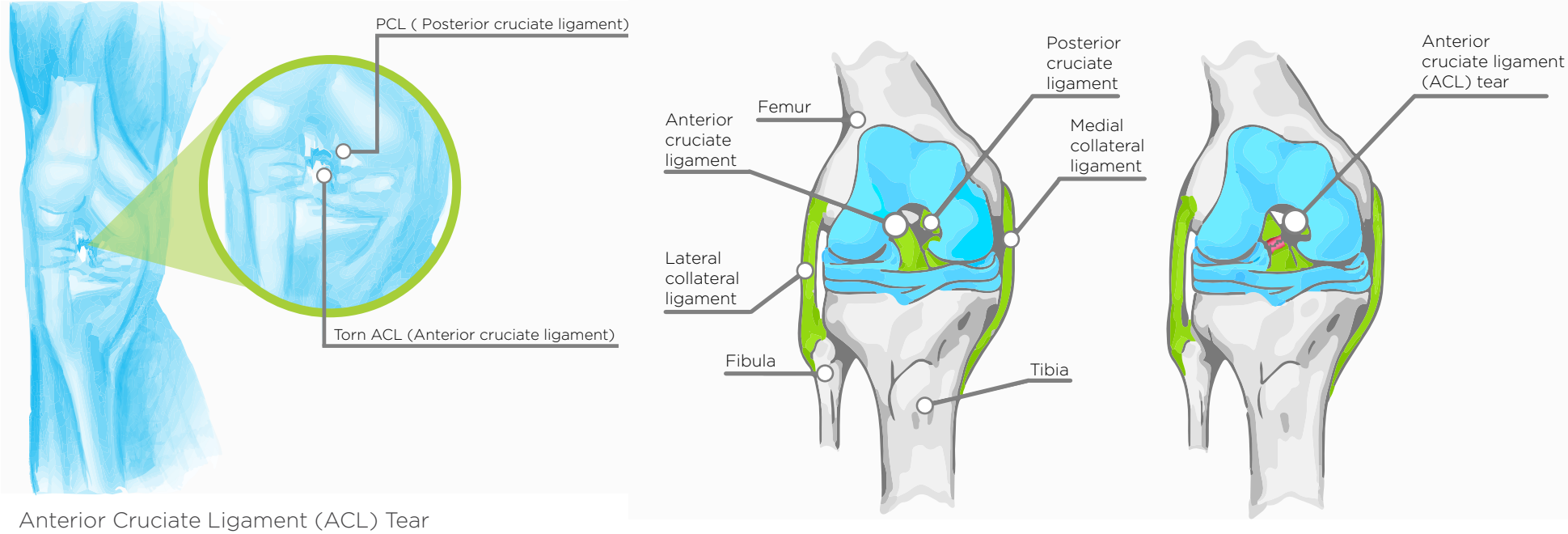
The effectiveness of exercise in hip and knee OA is well recognized to improve muscle function, prevent abnormal movement and restore normal biomechanics of hip and knee. In addition, it has been shown that strength training and weight reduction decrease the pain experience and regular medication use and prolong the time until total joint replacement.



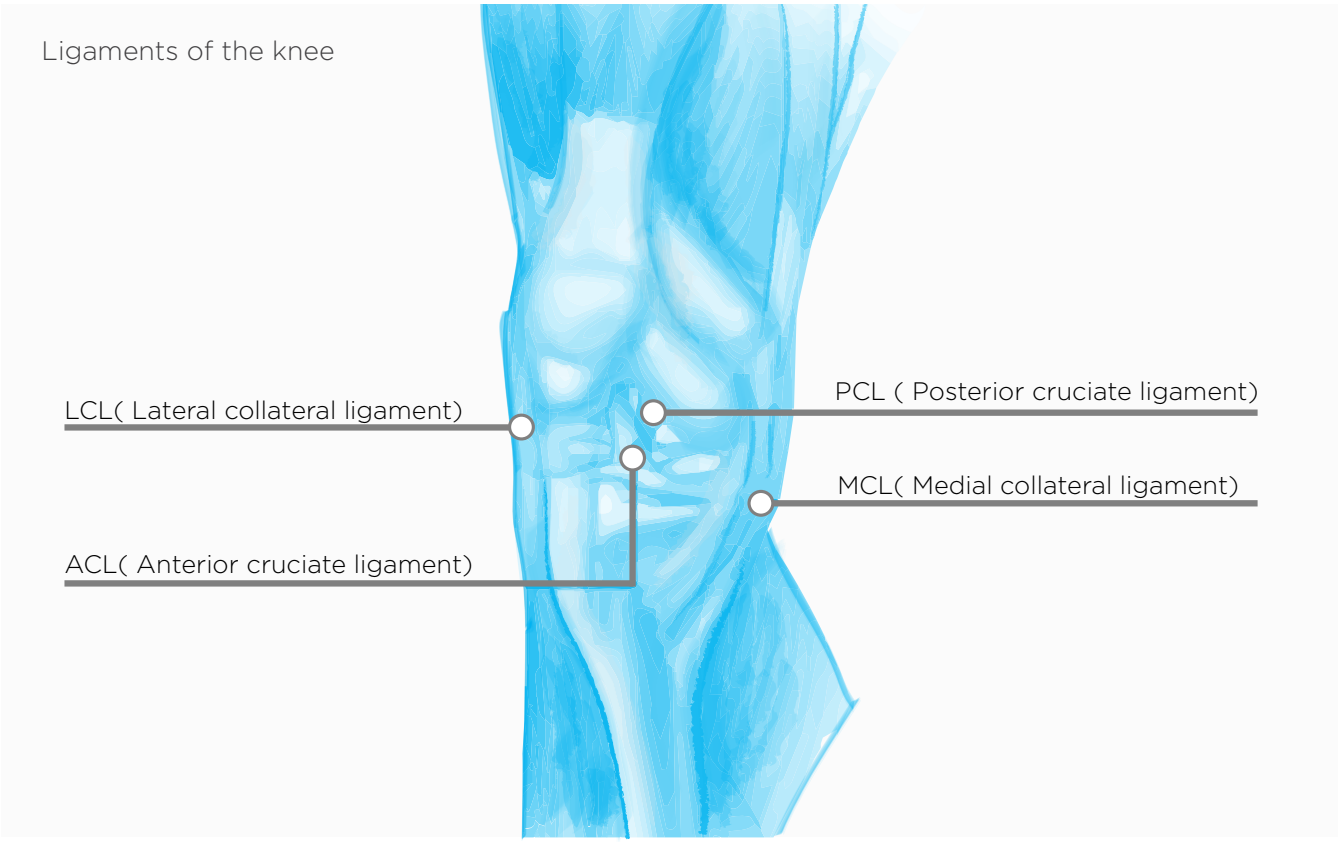
Knee injuries

Anterior cruciate ligament (ACL) injuries are among the most common knee injuries, with over 100,000 tears in the US occurring annually. It is one of the four major ligaments providing stability to the knee when moving and playing sports. The other major ligaments providing stability to the knee are posterior collateral ligament (PCL), medial collateral ligament (MCL), and lateral collateral ligament (LCL). The ACL plays the most important role in stabilizing the knee by preventing anterior tibial displacement.

After a knee injury, regardless of whether surgery will take place or not, rehabilitation focuses on regaining range of movement, strength, proprioception and stability, in addition to reducing swelling and pain during the acute phase of an injury.



Anterior Cruciate Ligament (ACL) Tear



Greater attention to involved lower extremity eccentric strength may greatly enhance patient function following knee rehabilitation. Restoring involved lower extremity strength and power within 80% – 90% of the noninvolved lower extremity before sport-specific training is recommended. Muscular strength test has been proposed to be an important tool to determine if an athlete can return to competitive sports after ACL reconstruction.

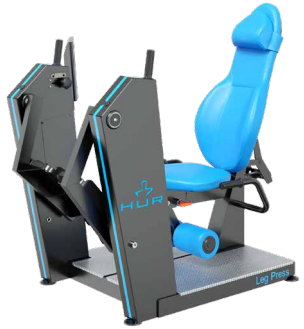
Outcome measures

In order to gather information on the baseline status and effectiveness of the rehabilitation process, each patient is evaluated in several ways. Objective measures for range of movement, strength and stability, and questionnaires related to an individual's experience of pain and health-related quality of life (if appropriate) are utilized. In addition, soreness and swelling are evaluated.

The maximal isometric strength of knee and hip can be evaluated by the HUR Performance Recorder for the assessment of side-to-side differences and to document changes in strength after the intervention.

The Performance Recorder can be directly connected to all HUR exercise machines equipped with the isometric testing sensor attachment.

Recommended HUR equipment for hip and knee rehabilitation



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LEG PRESS REHAB

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LEG EXTENSION /
CURL REHAB

5520
ADDUCTION /
ABDUCTION REHAB

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BODY EXTENSION REHAB

5310 ABDOMEN /
BACK REHAB

5340
TWIST REHAB

PULLEY

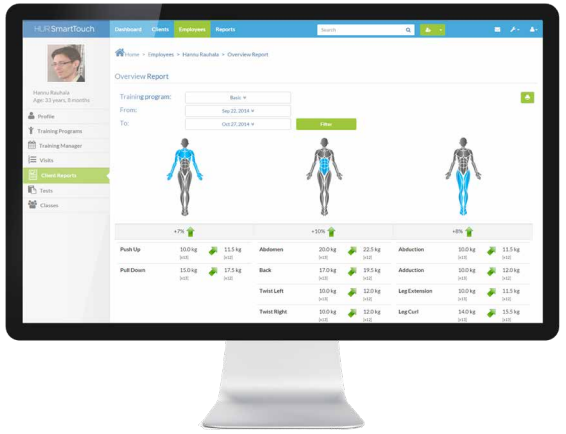
Performance Recorder PR1

A gentle and versatile method for hip and knee rehabilitation

The intelligent HUR equipment for rehabilitation, exercise and testing enables the user to start rehabilitation early and safely, whatever the hip or knee disability.

The core of the HUR equipment is HUR's Natural Transmission with pneumatic technology, and the HUR SmartTouch intelligent software, which together offer the following features:

- safe natural movement with air resistance
- resistance is adapted in accordance with the production of force, regardless of the speed of the movement
- close to zero starting load
- 100 g/1 kg increments in resistance
- range limiters
- additional support
- connected outcome measures to document the effectiveness
- individual programs
- automatic setup of position (lever arms and back support), load and repetitions
- automated reporting
- touch screen



Example of HUR concept for total hip replacement rehabilitation

The main factors defining the rehabilitation process are the surgical approach and the general state of the patient. Whether the patient desires to gain physical fitness or wishes to recover for recreational activity should also be considered when establishing the rehabilitation program. The given order is not fixed and should be interpreted as an example. However, it shows a progressive contribution of the patient in the therapy. It should start as soon as possible according to the patient's tolerance and medical recommendations.

Action	Post-operative Days		Post-operative	Post-operative Months	
	Day 1	Day 2-7	week 2-4	1-3	3-12
Prevention of dislocation:					
Hip flexion above 90°, endorotation and adduction across midline	X	X	X	X (6 weeks)	
Acute in hospital and post discharge:					
Ankle pumps	X	X	X		
Operative hip range on motion (HROM)	X	X	X		
Muscle strengthening: primarily hip	X	X	X		
abductor and extension	X	X	X		
Gait training (with assistive devices and stair climbing technique)		X	X		
Proprioceptive training		X	X		
Functional training (daily living)		X	X		
Endurance training		X	X		
Pain control/edema reduction	X	X	X	X	

Action	Post-operative Days		Post-operative	Post-operative Months	
	Day 1	Day 2-7	week 2-4	1-3	3-12
Therapeutic exercise:					
Passive, active-assisted and active HROM			X	X	X
Closed kinetic chain activities			X	X	X
Stationary biking			X	X	X
Aquatic therapy/activities			X	X	X
Scar massage/mobility			X	X	X
Strengthening with HUR equipment:					
Knee flexion hamstring curls			X	X	X
Knee extension quadriceps			X	X	X
Hip abduction-adduction				X (adduction after 6 wks)	X
Leg press			(X)	X	X
Abdomen/Back/Twist			(X)	X	X
Pulley (case specific exercises)			(X)	X	X
Balance/proprioceptive training with HUR SmartBalance			X	X	X
Endurance training			X	X	X
Gait training			X	X	X
Functional training			X	X	X

Example of HUR concept for ACL reconstruction rehabilitation

The main factors defining the rehabilitation process are the surgical approach and the general state of the patient. Whether the patient desires to gain physical fitness or wishes to recover for recreational activity should also be considered when establishing the rehabilitation program. The given order is not fixed and should be interpreted as an example. However, it shows a progressive contribution of the patient in the therapy. It should start as soon as possible according to the patient's tolerance and medical recommendations.

Action	Post-operative Weeks					Post-operative Months			
	1-2	3-4	5-6	7-8	9-12	4	5	6	7-12
Brace: immobilizer for patient comfort	X	(X)							
Range of motion minimum goals: 0°-110° 0°-120° 0°-135°	 X	 X	 X						
Weight bearing: 1/2 body weight Full	 X	 X							
Patella mobilization	X	X	X						
Modalities: Electrical muscle stimulation Pain/edema management (cryotherapy)	 X X	 X X	 X X	 X	 X	 X	 X	 X	 X

Action	Post-operative Weeks					Post-operative Months			
	1-2	3-4	5-6	7-8	9-12	4	5	6	7-12
Stretching:									
Hamstring, gastrocnemius-soleus, iliotibial band, quadriceps	X	X	X	X	X	X	X	X	X
Strengthening:									
Quadriceps isometrics, straight leg raises, active knee extension	X	X	X	X					
Closed-chain: gait retraining, toe raises, wall sits, mini-squats	X	X	X	X					
Strengthening with HUR equipment:									
Knee flexion hamstring curls	X	X	X	X	X	X	X	X	X
Knee extension quadriceps	X	X	X	X	X	X	X	X	X
Hip abduction-adduction	X	X	X	X	X	X	X	X	X
Leg press	X	X	X	X	X	X	X	X	X
Abdomen / Back / Twist	X	X	X	X	X	X	X	X	X
Pulley (case specific exercises)	X	X	X	X	X	X	X	X	X
Balance/proprioceptive training with:									
HUR SmartBalance	X	X	X	X					
Balance board, mini-trampoline				X	X	X	X	X	
Conditioning:									
Bike (stationary)		X	X	X	X	X	X	X	X
Aquatic program		X	X	X	X	X	X	X	X
Swimming (kicking)				X	X	X	X	X	X
Walking				X	X	X	X	X	X
Running: straight					X	X	X	X	X
Full sports or previous activity							X	X	X

References
(Hip and Knee Concept)

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NOTE: The treatment of diseases should always follow the quidelines given by the treating party.