



ChondroCelect[®] Rehabilitation Guide

for patellar and trochlear articular cartilage repair

INTRODUCTION

ChondroCelect[®] is advanced tissue-engineered technology which is used for Characterised Chondrocyte Implantation (CCI) articular cartilage repair. This technology was developed by TiGenix in Belgium and it is fully licensed in EU countries as Advanced Therapy medicinal Product (ATmP). ChondroCelect[®] is an innovative, advanced cell therapy procedure which is based on viable autologous cartilage cells (chondrocytes) that are expanded *ex vivo* through a highly controlled and consistent manufacturing process. This technology is similar to ACI (autologous chondrocyte implantation) which has been used in Sweden for almost two decades and for over a decade elsewhere in Europe and the USA.

CCI consists of two surgical stages: the first one is an initial day-case arthroscopic surgery (CCI Stage 1 or Chondral Biopsy) during which the inside of your knee joint will be assessed and a small piece of healthy articular cartilage (chondral biopsy) will be taken (*picture 1*). The cartilage sample is sent away to a tissue-engineering laboratory where the cartilage cells (chondrocytes) are cultivated (for more information on chondrocyte culture and ChondroCelect[®] technology please visit TiGenix website, www.tigenix.com). You will be re-admitted approximately 4 to 6 weeks after your chondral biopsy for the re-implantation of the cultured chondrocytes (CCI Stage 2 or Chondrocyte Implantation). This procedure is done through an arthrotomy (open knee surgery). The cartilage defect is debrided down to the subchondral bone and the recipient site prepared (*picture 2*). The defect area is covered with tissue-engineered Chondro-Gide[®] bilayer collagen membrane which is soaked with chondrocyte suspension, stitched in place circumferentially with very thin resorbable stitches and sealed with fibrin adhesive (*picture 3*). This membrane is a CE-registered product, constructed specifically for the treatment of articular cartilage defects (for more information please visit Geistlich website www.geistlich.ch). The remaining chondrocyte suspension is injected under the membrane and into this "bioactive chamber" (*picture 4*). Within this chamber the cells will undergo re-differentiation and will be stimulated by growth factors to proliferate and regenerate their specific cartilage matrix.

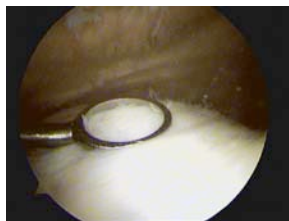
For more information on articular cartilage repair and CCI surgery and rehabilitation please visit www.kneeclinic.info (articular cartilage page).

References:

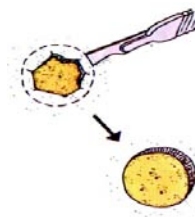
1. Jones DG, Petersen L. **Autologous chondrocyte implantation**. *J. Bone Joint Surg Am*, November 2006; 88: 2501 - 2520. www.ejbs.org
2. Harris JD, et al. **Autologous Chondrocyte Implantation: A Systematic Review**. *J Bone Joint Surg Am*, September 2010; 92: 2220 - 2233.
3. Peterson L, et al. **Autologous Chondrocyte Implantation: A Long-term Follow-up**. *Am J Sports Med* June 2010 38 1117-1124
4. Saris D, et al.: **Treatment of Symptomatic Cartilage Defects of the Knee: Characterized Chondrocyte Implantation Results in Better Clinical Outcome at 36 Months in a Randomized Trial Compared to Microfracture**. *Am J Sports Med* November 2009 37 10S-19S.



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GENERAL GUIDELINES

On the day of admission for day-case **CCI Stage 1** (arthroscopic chondral biopsy) you will be seen by your surgeon and one of our physiotherapists who will tell you more about ACI surgery and rehabilitation.

On the day of admission for inpatient **CCI Stage 2** (open chondrocyte implantation) you will be seen by one of our physiotherapist who will demonstrate and fit the **knee brace, CPM, Cryo/Cuff cooling device**, and show you how to use your elbow **crutches**. The physiotherapist is there to answer your questions and explain any of the post-operative procedures to you so that you will know what to expect and be prepared for your surgery and post-operative recovery. Please use this time to discuss any aspects of your treatment that concern you.

REHABILITATION GUIDELINES

The concept of slow, gradual maturation of the repair tissue is crucial to understanding the rehabilitation following CCI surgery. This process takes a long time and requires an understanding of the healing process in conjunction with considerable patience. Your cartilage repair starts life as a liquid covered with watertight resorbable membrane. Whilst the repair is solidifying it has no strength and is in inherent danger from compression and repetitive friction.

It is therefore important for you to avoid excessive impact, loading and shearing forces for the first 12 weeks as these may damage the repair or disperse the chondrocytes. This will be explained to you further by your physiotherapist. Once the repair has solidified it goes through a process of remodelling and maturation that can continue for up to 12 to 24 months following your operation. Throughout the healing process your rehabilitation programme will be based on your individual functional progress. Remember that the consistency of your "new" cartilage is:

- after 1 week like WATER
- after 3 months like YOGHURT
- after 6 months like DOUGH
- after 9 months like CHEESE
- and after 12 months like RUBBER

To get the maximum benefit from your CCI you should adhere to your specific rehabilitation programme. This will include progressive weight-bearing, range of motion and muscle strengthening exercises. The mobility and strength exercises start directly after your operation, as this helps to stimulate the growth and proper development of the implanted cultured chondrocytes. A balance of mobility and strength training combined with functional exercises and rest will give the best CCI results.

You will spend time with your physiotherapist but the majority of your rehabilitation will be self-managed at home. A personal commitment to your rehabilitation will be essential and you will be expected to allocate sufficient time in each day to complete your programme. You should be prepared to maintain the rehabilitation programme for up to twelve months following surgery. When you complete your CCI rehabilitation you should be able to resume normal activities, including most non-contact sports.

It is important to note that the following CCI rehabilitation programme is a general guide. This may vary according to the site, size and extent of your repair, as well as your individual progress and other factors such as your age, your previous activity level and other surgical procedures on your knee. It is therefore essential to keep in contact with us and your local physiotherapist throughout this process. All contact details can be found at the end of this guide.

Reference:

1. Hambly K, Bobic V, Wondrasch B, Van Assche D, Marlovits S. **Autologous Chondrocyte Implantation Postoperative Care and Rehabilitation: Science and Practice.** *Am J Sports Med*, June 2006; 34: 1020 - 1038. <http://ajs.sagepub.com>

CCI REHABILITATION PROGRAMME

Prehabilitation and Preparation for Surgery:

Please remember that your postoperative progress will depend on preoperative muscle strength, flexibility, and general understanding of prehabilitation and postoperative rehabilitation. The aim is to:

- Increase leg muscle strength, especially quadriceps muscle,
- Increase upper body strength to improve general mobility when mobilising on crutches, and
- Work on balance and proprioception to improve stability when you are partial weight bearing.
- All this should be continued throughout your CCI rehabilitation.

Muscle Strengthening Exercises

Restoring your leg muscle function is one of the best ways to prepare for your Stage 2 surgery.

Upper Body Strengthening Exercises

When you are using crutches after CCI Stage 2 you will use your upper body, especially your arms, more than usual so undertaking some strengthening work is useful preparation.

Balance and Proprioceptive Exercises

Balance and proprioceptive training are very important components of this rehabilitation program. Proprioception is broadly speaking your body's ability to sense joint position in space. Proprioception helps to keep your knee joint functionally stable and it provides feedback to improve your balance. This is important for all everyday activities and even more so in sports. This will be very important for your stability when you are using crutches after the Stage 2 surgery.

CCI Stage 1: Arthroscopic Chondral Biopsy

Rehabilitation following autologous chondrocyte implantation starts with the recovery from the initial arthroscopy at which the sample of your cartilage cells was taken. The time between the two CCI stages (4 to 6 weeks) provides an ideal opportunity for you to focus on preparing your body and mind for the second stage rehabilitation. Your goals in the time between your arthroscopy (CCI Stage 1) and the chondrocyte implantation (CCI Stage 2) are to:

- **Recover from the arthroscopy**
For more information on arthroscopic surgery and postoperative exercises please ask for our **Arthroscopy Brochure** or download one from www.kneeclinic.info.
- **Understand and prepare for CCI Stage 2 rehabilitation**

Recovery Following Arthroscopy

These guidelines are for those individuals who have undergone arthroscopy solely for CCI chondral biopsy. If you have had other procedures in addition to the chondral biopsy your recovery from the arthroscopy may differ and your physiotherapist will discuss your individual rehabilitation requirements with you.

For the first few days following your arthroscopy you should expect some discomfort and swelling in your knee. This should resolve within the first couple of weeks. Swelling is best managed by rest, ice, compression and elevation. Use icing or a Cryo/Cuff cooling device to reduce swelling. Elevate your leg whenever possible.

You can put as much weight on your operated leg as you can tolerate. Your physiotherapist will help you to mobilise following arthroscopy and provide you with crutches if necessary.

To help prevent infection you should keep your knee clean, dry and covered. You will be able to shower 2-3 days after your arthroscopy as long as you cover the incisions with waterproof plasters. You shouldn't swim or bath until the incisions have healed (which usually takes 7-10 days).

Please note that you will not need a follow-up appointment between CCI Stage 1 and 2. However, if you have any concerns about your knee or postoperative recovery please contact the Physiotherapy Department (01244 684 314).

Understanding and General Preparation for CCI Stage 2 Rehabilitation

It is important for you to have an understanding of the CCI procedure and, in particular, the process and timescales for the healing of your cartilage repair. Your physiotherapist and your surgeon will be available to answer your questions and explain any of the post-operative procedures to you so that you will know what to expect and be prepared for your surgery and post-operative recovery. Please use this time to discuss any aspects of your treatment that concern you.

You will be reliant on your crutches for several weeks after CCI Stage 2 surgery so it is a good idea to get used to using them whilst you're not relying on them. If you have crutches from your arthroscopy practice walking with just placing your foot flat on the floor and going up and down stairs with the crutches. If you don't have crutches we will be happy to supply them.

In planning for your CCI Stage 2 rehabilitation there are some practical implications of the surgery that you may not have considered. A selection of helpful tips and suggestions to make your rehabilitation less problematic is included in the **Appendix** at the end of this guide.

CCI Stage 2: Chondrocyte Implantation

You will be admitted to hospital approximately 4 to 6 weeks after your initial day-case arthroscopic surgery for the second stage of the procedure, when the cultured chondrocytes will be implanted through open knee surgery.

If you were issued crutches and a Cryo/Cuff cooling device for use at home after your Stage 1 arthroscopy please remember to bring them with you for your second stage surgery.

The physiotherapist is there to answer your questions and explain any of the post-operative procedures to you so that you will know what to expect and be prepared for your surgery and post-operative recovery. Please use this time to discuss any aspects of your treatment that concern you.

The Postoperative Brace

Forces on the patellofemoral joint increase significantly with knee flexion so following the Stage 2 surgery you will need to wear a brace for 4 weeks or until you can actively bend your knee to 90 degrees, whichever is the later. The brace will help to protect your knee's repaired articular surface from too much compression and friction as this could damage the graft. The amount of flexion you will be allowed will depend on the location of your CCI repair:

- 0 to 20 degrees for distal (lower) patellar repairs
- 0 to 30 degrees for trochlea repairs
- 0 to 40 degrees for proximal (upper) patellar repairs

The brace will be measured pre-operatively, and you will be shown how to put it on, remove it and adjust it if necessary.

The brace will be fitted by the physiotherapist after the surgical procedure. Please do not alter the angle at the knee joint without consulting our physiotherapist as this will be pre-set and re-adjusted as you progress.

You should not remove the brace apart from short periods for exercising, washing and using the Cryo/Cuff. It should be worn overnight for the first 2 weeks. You should be aware that wearing this brace is likely to cause some discomfort. However, if you feel that this is intolerable, please discuss the situation with our physiotherapy department. You will be able to mobilise using your elbow crutches through your operated leg. We will teach you how to go up and down stairs.

Continuous Passive Movement Machine (CPM)

When the brace is removed for exercise you will spend some time, whilst you are an inpatient, on the CPM. When your leg is placed on the CPM, this enables you to bend your knee without any active movement by your own muscles. The degree of bend is programmed and set by the physiotherapist and will be altered as necessary, starting from 0° to 20° on day one progressing to 0° to 45° as tolerated. When you leave the hospital you will be able to continue to progress your knee range of movement with a programme of home exercises that your physiotherapist will show you before you are discharged.

Cryo/Cuff Cooling Device

The cooling device has three components, the cuff which fits around the knee and is secured with Velcro tape, the cooler itself and the connecting tube. The cooler is filled with water and ice, once the cuff is fitted and the tube connected, elevating the cooler forces cold water into the cuff and compresses the knee. This is left in place for up to 30 minutes. You may also be provided with an auto-chiller unit that comprises of a small pump that automatically circulates the cold water and applies alternating compression and relaxation. This will help reduce post-operative pain and swelling. For more information on Cryo/Cuff see www.aircast.com.



Weight Bearing and Crutches

The knee is made up of two joints: the tibio-femoral joint and the patello-femoral joint. They function very differently mechanically. When the knee is fully straight there is no contact between the patella and the trochlea of the femur and for the first 20-40 degrees of knee flexion there is limited loading on the patella and trochlea. This means that after your CCI you will be able to progress to normal weight bearing as soon as possible without detrimentally loading your CCI graft. Progression of weight bearing should be guided by discomfort, stability and swelling. Hopping with the crutches or non-weight bearing (NWB) is not recommended as this may “jar” the knee joint and may be detrimental to your ACI graft.

The overall goals following CCI Stage 2 are to:

- Recover from the surgery
- Manage and decrease pain and inflammation
- Minimise risk of wound infection
- Protect the CCI repair
- Restore range of movement
- Increase joint stability
- Minimise impact of CCI on home/work life
- Regain normal gait pattern
- Restore confidence in knee
- Return to pre-activity levels including sport

Although time frames have been provided in the following rehabilitation programme these are for general guidance only and Mr Bobic and your physiotherapist will tailor the programme to your specific needs, based on the location of your chondral repair and your individual functional progress.

Rehabilitation Timeline (whilst you are in hospital):

1 to 3 days

- Mobilisation allowed with brace and crutches, weight bearing as tolerated,
- Circulation exercises,
- CPM,
- Isometric quadriceps setting exercises 6 seconds,
- Straight leg raise, with knee and foot supported by physiotherapist,
- Progressive gluteal, hamstring and calf muscle contractions.

Rehabilitation Timeline (when you go home):

1 to 3 weeks

For the first few weeks the activities you will be allowed to do will be fairly limited as your knee is quite vulnerable and needs time to start the healing process. Your CCI graft needs some movement and loading as a stimulus for repair but this needs to be controlled with plenty of time for recovery. So it is important to do the following exercises on a regular basis ideally at least 3 or 4 sessions per day with rest in-between. Monitor wound and skin areas under the brace, check any redness or abrasions. Contact us if you notice any problems with skin healing or any discharge from the knee.

- Circulation exercises,
- Inner range quadriceps (IRQ) exercises,
- Knee flexion and extension work,
- Active assisted and active heel slides,
- Straight leg raises,
- Heel raising,
- Hip extension and abduction exercises,
- Patellofemoral mobilisations (all directions),
- Early stage proprioception.

4 to 6 weeks

- Continue above exercises,
- Full weight bearing and walking without crutches,
- Progress flexion and extension work aiming for 120 degrees of flexion at 6 weeks,
- Isometric quadriceps training in different angles 6-10 second holds,
- Straight leg raises with 1 – 2 kilos (2 – 4.5 lbs),
- Theraband: standing straight leg resistance in all directions,
- Progress balance/proprioception exercises,
- Rowing machine no handle, progress as range of movement allows,
- Exercise bike (*passive range of flexion must be 100⁰, low resistance for mobility, 10 –15 minutes a day*),
- Commence hydrotherapy (*all the exercises can be done in water, swimming is allowed but no breast-stroke until 6 weeks*).

- You will gradually be weaned off the brace from four to six weeks. Your physiotherapist will assess the strength of your muscles and the stability of your knee joint before deciding when it is safe for you to start mobilising and exercising without it. You may be able to sleep without the brace from 2 weeks but it is ESSENTIAL that you replace it if you need to get up during the night.

7 to 12 weeks

- Patients should have full range of movement (*no resistance*),
- Gait re-education,
- Easy functional exercises (*closed chain*),
- Progress balance/proprioceptive training,
- Leg press both legs start with 10⁰ to 70⁰ minimal resistance,
- Small reciprocal step training including side to side/forwards to backwards,
- Full range rowing machine, low resistance, progress as pain allows,
- Progress gym work (*no heavy weights*),
- Treadmill slow walking,
- Static exercise cycling (resistance and time on the bike can increase by raising the number of "sets") progressing to outdoor cycling (gentle flat work, increasing distance and difficulty),
- Progressive closed chain quadriceps exercises (*wall slides*) progressing to isometric quadriceps exercises in different angles (*open chain*),
- Progressive weight bearing activity for proprioception (*mini-trampett work using double then single leg stance, wobble board*).

After 3 months

- Increase functional training,
- Treadmill – commence at fast walking and progress to a slow jog (*initially supervised by the physiotherapist*),
- Step machine/cross trainer interval training,
- Gradually increase walking distance,
- Circuit training (*supervised shuttle runs and gentle jogging – no sprints*).

After 6 months

- You should not jog or run unsupervised until 6 months,
- You can return to sports specific training at 6 months if all parameters (*determined by surgeon and physiotherapist*) are satisfactory,
- You must be confident in your own ability,
- Exercises should be maintained at a low level and non-contact, e.g. figure of 8 runs, gentle acceleration/deceleration runs.

Chondroprotective Agents

Glucosamine and chondroitin are very popular supplements that have received considerable press coverage over the last few years. Both GAIT and GUIDE studies suggest that, at least in the case of moderate knee pain, the combination of glucosamine and chondroitin sulphate in adequate dosage are helpful for your joint cartilage. For more information see the following article:

Reference:

1. Hambly K. **Do Glucosamine and Chondroitin sulphate work? An in-depth review.** *Knee Guru Kneeinsights*. April 2006.
 Weblink: www.kneeguru.co.uk/insights/doku.php/articular-cartilage/overview4.

RETURN TO ACTIVITY CRITERIA

When Can I Start Driving Again?

For your and other road user's safety, driving should not be commenced until your knee fully bends and is pain free (approximately 6 weeks after the operation). It is vital (literally) that you are able to perform an emergency stop. It is advisable that you contact your insurance company to ensure you have cover. For further information please visit DVLA's website (www.dvla.gov.uk).

When Can I Return to Work?

The time when you are ready to return to work depends on the individual as well as your type of job. As a general guideline:

- Sedentary jobs from 2 to 6 weeks allowing for the fact that the leg needs to be elevated for periods and you should be able to mobilise regularly during throughout the day. Getting to and from work may actually be more difficult than working, we do not recommend long periods in a car for the first 4 to 6 weeks following surgery.
- Non-sedentary jobs should not be considered for 6 weeks. Your health and the condition of your leg will be reviewed at a 6 week post-operative clinic, when a decision can be made. It is likely that any return to work would be between 8 to 12 weeks at the earliest.
- Please remember that you have had extensive surgery, and apart from giving your knee time to heal, you must allow your body time to recover. If you return to work too soon and feel tired you are more likely to harm your knee.

When Will I be Able to Fly?

There is no universal agreement as to when it is safe to travel by plane after CCI surgery. Most orthopaedic surgeons advise their patients not to fly for 4 to 6 to weeks following Stage 2 CCI. Short flights do not seem to be a problem. However, long intercontinental flights are a potential problem as there is an increased incidence of spontaneous DVT (deep venous thrombosis), even in the young and healthy passengers. It is possible that sitting for long period of time, in a confined space and with very little leg room in economy class, could predispose to the development of deep venous blood clots, even in healthy individuals, and especially in people following recent knee surgery. If you have to travel by plane, between 2 and 4 weeks after your CCI surgery, it would be wise to contact your airline's Medical Department and ask them for advice. Also, please discuss this issue with your GP, as you may have to take prophylactic measures and medication such as Aspirin or other anticoagulants for several weeks.

When Can I Return to Playing Sport?

Sports that can be participated in after 6 months are swimming, cycling and golf. Sports that should not be attempted until 1 year post operation are high-impact contact activities: badminton, tennis, squash, rugby, judo, hockey, football. For further information on return to activity after CCI surgery please see the following articles:

1. Hambly K. **Return to activity after ACI survey: understanding the cartilage repair experience from the patients' perspective.** *Knee Guru Kneainsights*, May 2006. Weblink: www.kneeguru.co.uk/insights/doku.php/articular-cartilage/overview2.
2. Mithöfer K, Peterson L, Mandelbaum B, Minas T. **Articular cartilage repair in soccer players with autologous chondrocyte transplantation: functional outcome and return to competition.** *Am J Sports Med*, November 2005; 33: 1639 – 1646. <http://ajs.sagepub.com>.

Strength Testing

Strength testing of the knee should only be carried out with the recommendation of your surgeon. Isometric test is recommended at 6 months in 15, 30 and 60 degrees. Isokinetic test is recommended for femoral and tibial transplants at 9 months, and for patellar and trochlear at 12 months.

REHABILITATION SUMMARY

Key words for CCI rehabilitation are:

- **Mobility Exercises**
- **Protection**
- **Isometric Strength Training**
- **Functional Exercises**
- **Patience!!!**

Within these guidelines there is space for a lot of individual adjustments. The rehabilitation programme should be tailored around your individual needs and physical status, as well as increases and changes. The rehabilitation process expands over a long period of time. Even when you are training alone it is advisable that your surgeon and physiotherapist are available for consultation.

ANY CONCERNS?

- It is normal to experience local swelling and increased warmth in the knee in the first few months. Generally, if pain and swelling occur in connection with exercise - reduce the load.
- Crepitation (creaking or grinding) can occur in the knee. If it is not associated with pain it can be described as a 'hypertrophic tissue growth' or soft tissue that is formed by loading.
- If a disturbing or functional "catching" occurs in the range of motion, dynamic quadriceps exercises should be performed above and below the "catch". Exercise without weight throughout the entire range of motion.

Problems: who to contact?

If you experience problems with your CCI rehabilitation please contact our Physiotherapy Department (direct line 01244 684 314), or email Claire Lloyd, Physiotherapy Manager (claire.lloyd@nuffieldhospitals.org.uk). If you have any concerns about the appearance of your wound please contact the ward directly (01244 684 311), to discuss the situation. If you live far away from Chester Grosvenor Nuffield Hospital we may refer you to your GP or to the local hospital. **In an emergency please contact Mr Bobic directly on 07774 981 481.**

This guide was put together in July 2003 by:
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This guide was modified and updated in November 2006 by:
Karen Hambly, Linda Bostock, Claire Lloyd and Vladimir Bobic

Last update: January 2011

Appendix 1: Practical Advice for CCI Rehabilitation

This section has been developed for Chester Knee Clinic by Karen Hambly, Senior Lecturer, Centre for Sports Studies, Tissue Repair and Rehabilitation Research Group, University of Kent, Chatham, UK (www.centreforsportstudies.co.uk), to provide some helpful tips and suggestions to make life a bit easier for you during your ACI recovery.

Don't be daunted by the amount and extent of the advice provided. Although rehabilitation following CCI can have a significant impact on your life for a short time, individual needs will vary considerably so not all of the advice will either apply or be of interest to you, but hopefully you'll find some useful tips:

Preparing for your surgery:

- It's a good idea to get your work, home and personal life in order before your surgery.
- You may not be able to get to a bank or post-office as easily as usual so it is advisable to get house-hold and personal bill payments either paid or set up in advance to cover the first month of your recovery.
- On the work front make sure that key individuals e.g. Human Resources Manager and your Line Manager are fully aware of your surgery and the implications it will have on your work and keep them informed of your progress as you recover. Think about arranging cover for your work, redirecting telephones, putting 'out of office' on for your emails and generally informing people that you won't be available.
- You may have some difficulty in carrying out some of your normal personal grooming after your surgery. It is advisable to cut your toe nails, have your hair cut, wax/shave your legs (applies mainly to the ladies!) and the suchlike just before you have your surgery.
- Before you have your surgery walk around your home with your crutches and remove any obstacles or furniture that is in the way. Arrange your home to make it easier to get around – watch out for anything on the floor, cables, narrow spaces and uneven surfaces.

Things to take into hospital with you:

- When you go into hospital as an inpatient for your CCI Stage 2 surgery it may well be the first time you've stayed over night in hospital. You will be provided with general hospital admission information with advice with your written admission confirmation. A few additional tips are to take:
- Face and body "spritz" spray - really nice and refreshing especially when you're not able to have a proper wash or shower.
- Sports water bottle – doesn't spill, holds a reasonable amount of liquid and is easy to drink from.
- Shorts, shorts and more shorts – but they need to have fairly baggy legs to get over your knee brace
- Dry shampoo for freshening up your hair on the days when you can't get it washed.

- Phone and address book for friends and family.
- Books, magazines, personal stereo with headphones.
- Other items that you may find useful to take are a travel clock; a few personal photos; earplugs; mouthwash; bottle of squash; and a laundry bag.

When you get home

- Personal support: if you can, arrange for someone to be around for the first 1 or 2 weeks after your surgery. Alternatively you may prefer to organise to go to stay with family or friends.
- During your recovery you may find yourself somewhat isolated due to being away from work and with a restricted social life. There are ways that you can keep in contact with friends.
- Let your friends know where you are and how and when they can contact you before you have your surgery.
- Remember that you will need time to rest (especially in the first few weeks after your surgery) and to do your rehab so it's worthwhile try to plan your visitors.
- If you like to use email to keep in contact with people make sure your computer and/or telephone socket are in an easily accessible place. A good solution is to buy a telephone extension cable (30 metre extension for under £10) and that way you can have internet access in the room of your choice. Even better is to get a wireless connection.

Around the house

- Choose a chair to sit in that has arms that you can use to help you rise to standing.
- Make sure you have a chair or stool in each of the rooms you tend to use most e.g. kitchen, bathroom, bedroom.
- Place a plastic garden chair in the shower ideally on a non-slip mat. You can then sit down whilst you're showering which makes life a lot easier and safer whilst you are partial weight bearing.
- If you've got room place a chair in the bathroom in front of the wash basin and check that you are able to see a mirror when sitting for shaving/make-up etc.
- It's worth checking that your wash basin/sink is securely fastened to the wall as you will find you will tend to use it as a balance support when you are partial weight bearing.
- If your toilet is quite low you may find a raised toilet seat will help in the first few weeks after your surgery.
- A trolley on wheels is really useful to push around drinks, food, laundry, books and other items you won't be able to carry whilst you're on crutches.
- If you want to spend some time outdoors in the garden whilst you are recovering look to buy or borrow a sun lounger with a full length leg rest.

Entertainment

- It is important to decide where you would like to spend most of your time once you are discharged from hospital and set up the room so that everything you may need is accessible from one place.
- Books, magazines, videos, DVDs, music, personal hi-fi, radio, Game Boy, Play Station: make sure you have a good stock of whatever you like to keep you entertained with any remote controls close by.
- Vacuum flask – for hot or cold drinks. Fill up once and keeps you in drinks for quite a few hours.
- Multi-socket extension lead – plenty of plug sockets to power and charge e.g. mobile phones, computers, stereos etc. Get plenty of spare batteries if items aren't mains powered.
- Make sure you have a table by your chair/bedside - lets you keep lots of stuff within arms reach.
- Small rucksack or bumbag – good hands free way of carrying things around the house whilst you're on crutches.

Getting about

- Getting in and out of a car can be difficult especially when you leg is in full extension in a brace. If you're sitting in the front make sure the seat is back as far as possible.
- Put together a list of people who would be willing to ferry you around.
- Although not advisable in the early stages of your recovery, if you do have to undertake a long journey in a car sitting across the back seat with both legs up is quite comfy or if the car is small another option is to take the front passenger seat out of the car (you may need to go to a garage with special tools to do this) and replace it with a large bean bag. This lets you sit on the rear seat with your leg level and supported on the bean bag.
- You will need to crutches for quite a few weeks and some people find the handles on the elbow crutches can cause problems with chaffing or blisters on your hands. Try using some pipe insulation around the grips or wearing cycling gloves whilst you're mobilising. If you find the grips on the crutches are too slippery a cut up cycle inner tube makes a good non-slip covering.

Clothing

- If you have your surgery during the summer you will probably be able to wear shorts most of the time but if the weather is cooler you will need to consider warmer clothing that you can wear with a knee brace. One suggestion is to try tracksuit bottoms that have full length zips or poppers down the side of the leg.
- In a knee brace even simple tasks such as tying shoe laces can be a challenge. Think about footwear that you can put on and take off more easily – backless shoes, flip-flops, slip on shoes etc.
- Waterproof, non-slip shoes are good for when you're in the shower and also if you go to the swimming pool to exercise.

Meals

- Before you go into hospital cook some meals that can be easily frozen and reheated in a microwave.
- Think about the lay out of your kitchen shelves and before your surgery and make sure the items you tend to use most are close to hand.
- Internet supermarket shopping with home delivery is excellent but make sure you arrange for someone to be there when it arrives to put the shopping away for you in places that you can easily reach.

Rehabilitation planning

- Ice blocks (like the ones used in picnic cool boxes) or rolls of ice-cube bags are useful for the Cryo-cuff. It's a good idea to have two sets so that you always have one set freezing whilst one is in use.
- Find a piece of board (about 20cm x 45cm approx) that has a smooth, shiny surface (hardboard, MDF or similar) to use for your heel slide exercises. Wearing socks and sprinkling some talcum powder on the board helps to decrease the friction on the heel as well.
- If you don't have any 1 or 2 kilogram ankle weights for your rehabilitation try using an oven glove with a tin in each side over your leg or putting a tin in a sock and then tying two socks together.
- If you don't know where you can use a hydrotherapy or swimming pool it is worth doing a bit of homework and finding out where you can use one, times and cost before your surgery.

For more information on cartilage repair and rehabilitation please visit Karen's website: www.cartilagehealth.com.

If you have any further tips or suggestions to add to this practical advice, as you go through your own CCI rehab, please send an email to: info@kneeclinic.info