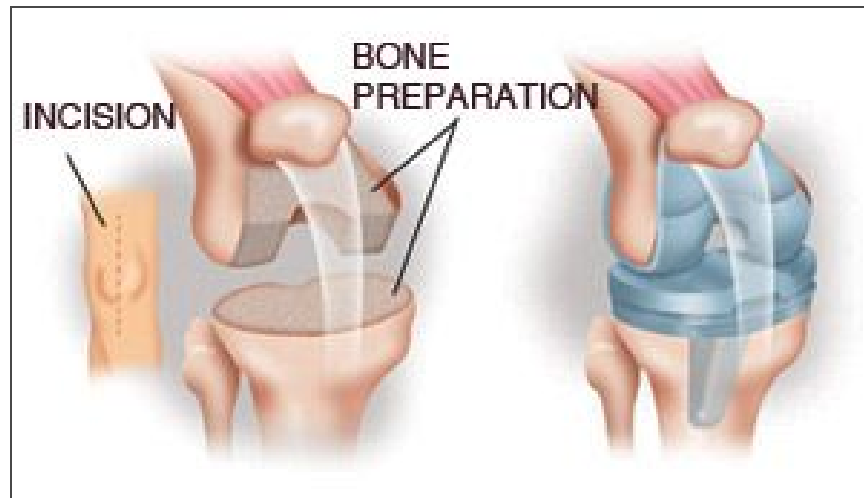


# Total Knee Replacement



This section will provide information for you and your family regarding total knee replacement surgery. The surgical procedure, preoperative and postoperative care, the risks and benefits of surgery, as well as rehabilitation are explained. Please read this section carefully and discuss the information with your family before your total knee replacement surgery.

Dr. Larson and his staff have two main goals for you: to restore your knee to a painless, functional status, and to make your hospital stay not only comfortable, but as beneficial as possible as you prepare to return home. You and your family members should feel free to ask questions or share concerns with the staff.

## What is a Total Knee Replacement?

Total knee replacement is a surgical procedure in which injured or damaged parts of the knee joint are replaced with artificial components, called a prosthesis. The procedure is performed by separating the muscles and tendons on the front of the knee to expose the knee capsule (the tough, gristle-like tissue surrounding the knee joint). The capsule is opened, exposing the inside of the joint. The ends of the thigh bone (femur) and the shin bone (tibia) are removed and often the underside of the kneecap (patella) is removed. The artificial parts are now put into place.

Your new knee will consist of a metal shell on the end of the femur, a metal and plastic trough on the tibia, and if needed, a plastic button on the kneecap. Some patients may be candidates for mini or small incision surgery. Dr. Larson will talk with you about this possibility. Your surgery may be done with the assistance of a computer (computer navigated surgery) or a MAKO robotic-arm. This may help to align your knee to reduce the chance of it wearing out. The new artificial components are held in place by bone cement (cemented total knee replacement), or are specially modified to allow your bone to grow into the components (uncemented total knee replacement). New technology has made uncemented prosthesis more common.

# Total Knee Replacement: Ideal Candidates

## Who Is a Candidate for Total Knee Replacement?

Total knee replacement is usually performed for severe arthritic conditions. Most patients who have artificial knees are elderly, but the operation is performed in younger people. Circumstances vary, but patients are generally considered for total knee replacement if:

- Pain occurs daily.
- Pain is severe enough to restrict not only work and recreation, but also the ordinary activities of daily living.
- Significant stiffness of the knee results in loss of motion.
- The knee constantly gives way (significant instability).
- The knee is significantly deformed (knock-knees or bowlegs).

## Total Knee Replacement: Expectations and Risks

### What Are the Expectations of a Total Knee Replacement?

An artificial knee is not a normal knee, nor is it as good as a normal knee. However, patient outcome studies have shown that 90% to 95% of patients are still satisfied with the new knee 12 to 15 years after surgery, indicating that their pain is minimal or absent and that their function has improved. About 90% of patients with a stiff knee before surgery will have better motion after a total knee replacement.

If replacement provides you with pain relief and if you do not have other health problems, you should be able to carry out normal activities of daily living. The artificial knee may allow you to return to some active sports or heavy labor under your physician's instructions. A list of activity recommendations is found at the back of this booklet.

### What Risks Are Associated With Total Knee Replacement?

Total knee replacement is a major operation. Some risks are similar to most major operations. These include bleeding, injury to nerves and blood vessels, and risks related to anesthesia. The effect of most complications is simply that the patient stays in the hospital longer. The most common complications are not directly related to the knee and do not usually affect the result of the operation. These include:

- Blood clots in the leg.
- Urinary tract infections or difficulty with urinating.

- Blood clots in the lung.

Complications that directly affect the knee are less common, but are more likely to limit the success of the operation:

- Some knee pain.
- Stiffness.
- Infection in the knee.
- Loosening of the implant components.

A few of the complications, such as infection, loosening, or stiffness, may require reoperation - called revision surgery. Infected artificial knees usually have to be removed and antibiotics must be administered for at least six weeks. After completing the course of antibiotics, the surgery can often be repeated. Although rare, death can occur from complications of any major operation.

The major long-term problem is loosening of the prosthesis. This occurs either because the plastic insert wears out, causing the bone to resorb (osteolysis) or because of infection or trauma. With the recent redesign of new knee components we feel the new knee will last up to 20 years.

Loosening is, in part, related to how heavy and how active you are. Loose, painful artificial knees can usually, but not always, be replaced. The results of a second operation are not as good as the first and the risk of complications is higher.

## Total Knee Replacement: Preparing for Surgery

Preparing for a total knee replacement begins several weeks ahead of the actual surgery date. Maintaining good physical health before your operation is important. Activities that increase your upper body strength will improve your ability to use a walker or crutches after the operation.

### Considering Blood Transfusion

In less than one percent of patients, a blood transfusion is necessary after knee surgery.

To help reduce bleeding after surgery, a special medicine is used called Tranexamic acid, which is given to you in surgery into your IV.

Your blood count is checked after surgery and you are monitored closely. However, the need for a transfusion is rare.

### Ensuring Overall Good Health

Dr. Larson will order blood tests and a urinalysis before surgery to make sure a urinary tract infection is not present. Urinary tract infections are common, especially in older women, and often go undetected. Your teeth need to be in good condition, too. An infected tooth or gum can be a possible source of infection for the new knee. Dr. Larson will work closely with your medical doctor and may ask you to

see him or her, especially if medical problems have been present in the past. The medical doctor can help assess your risk for surgery and will help provide continuity of care afterwards.

## Arranging Help at Home

When making preparations for surgery, you should begin thinking about the postoperative recovery period. Discharge from the hospital is typically anticipated 1 to 2 days after surgery – but it may take several weeks for a patient's energy level to return to normal. Also, movement restrictions following knee replacement can make everyday activities like bathing, dressing, and getting meals very challenging. A patient with a new knee replacement may need help at home for the first few weeks. We encourage patients to use home health services especially home physical therapy. Dr. Larson's office can help arrange this.

If assistance from someone at home is not possible, it may be necessary to arrange to stay in an extended care facility for a few weeks. A social worker is available at the hospital to plan an extended period of recovery if necessary. If you feel you may require assistance in this regard, we encourage you to contact Dr. Larson's nurse or the hospital before surgery.

## Total Knee Replacement: Preoperative Visit

Patients must make a visit to the doctor's office one or two weeks before their actual surgery date. This is a time for you to have all your questions answered and to ensure you are in the best possible health before surgery.

At your pre-op visit, Dr. Larson or his assistant will review your medical history and the medications that you take. Be sure to report all medications you are taking, including prescription and nonprescription and herbal or nutritional supplements. You may be instructed to stop taking any anti-inflammatory medication (ibuprofen, Naprosyn, Relafen, Daypro, etc) and any blood-thinning medication (aspirin, coumadin, plavix) 1 week before surgery.

The pre-op visit will also include listening to your heart and lungs, a general physical exam, and checking for any type of infection. Any blisters, cuts, or boils should be reported. Blood will be drawn and lab tests done to ensure that you are in good general health. X-rays are taken if necessary. An EKG is obtained if you have not had one in the past two months or if otherwise indicated. If infection is found, surgery is generally delayed until the infection is cleared. If you get a cold or flu or become ill at any time before surgery, you need to call Dr. Larson. Remember, we want you to be in your best possible health!

## General Information to Remember

### Diet

You should follow your regular diet on the day before your surgery. **Do not eat or drink after midnight the night before surgery.** On the morning of surgery you may brush your teeth and rinse your mouth without swallowing any water.

## Bathing

A shower, bath, or sponge bath should be taken the evening before surgery. If possible, you should shampoo your hair. Nail polish and makeup should be removed.

## Deep Breathing Exercises

You will be instructed in deep breathing exercises to minimize the risk of lung complications after surgery. These exercises are necessary to remove any excess secretions that may settle in your lungs while you are asleep during surgery. These exercises are to be done every one to two hours after surgery. An incentive spirometer may be demonstrated. This bedside device assists you in deep breathing exercises.

## Blood Clot Prevention

At the hospital on the morning of your surgery, you will be fitted with elastic support stockings (TEDS). These stockings aid circulation within your legs and feet to reduce the risk of blood clots. Compression stockings or booties will be placed on your legs immediately after surgery. These gently squeeze your feet and legs to keep the blood moving, helping to prevent blood clots. You will also be given daily oral medication.

## Pain Control

If possible, you will receive a nerve block and a spinal anesthesia. You will also be given sedation medicine to rest comfortably during the surgery. You will receive your first oral dose of medicines before the procedure begins. Dr. Larson will also inject medicine into your knee during surgery. All of this will help control the post-operation discomfort. Dr. Larson will also prescribe pain medication to be taken by mouth to help prevent against a blood clot at home. It is important to continue taking your pain medication because preventing pain is easier than "chasing" it. If you continue to have pain after taking the medication, we encourage you to notify your doctor or nurse so that alternate methods of pain control can be started.

## Surgical Checklist

### Night Before Surgery

- Shower.
- Nothing to eat or drink after midnight.
- Review preoperative visit and general information.

### Day of Surgery - at Home

- Brush teeth without swallowing water.
- Approved routine medications with a sip of water (as instructed by your doctor).

- Leave on time for the hospital.

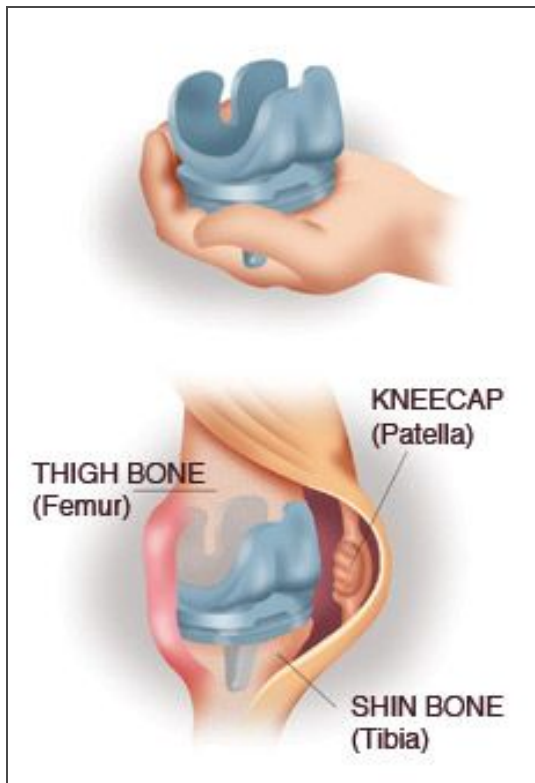
## Total Knee Replacement: Day of Surgery

You will be admitted to the hospital on the day of your surgery. You should arrive at the hospital at the appointed time. A nurse will spend a few minutes making sure that you are still in good health and ready for surgery. Please make note that, while the nurses try to accurately estimate when you need to be at the hospital, it is hard to predict how long every surgery is going to take. You may go in promptly or you may have to wait for some time. Bring something to do to help pass the time.

### Just Before Surgery

You will be asked to change into a hospital gown. Your blood pressure, temperature, heart rate, and breathing will be checked. An IV (intravenous) line will be started to provide fluids and antibiotics. The anesthesiologist will talk with you about your health status and appropriate anesthesia you should have for your operation. Options include either a general anesthetic (going to sleep) or a spinal anesthetic (numbing you from the waist down). They will discuss the associated risks and benefits with you. Dr. Larson recommends a spinal anesthesia with a nerve block if possible.

### In the Operating Room



You will be taken to the operating room. Your anesthesia will be administered and a urinary catheter will be inserted. A tourniquet will be applied to your thigh to help control bleeding. Your leg will be sterilely prepared. An incision will be made in the front of your knee.

The damaged arthritic bone will be removed and the remaining bone surfaces in the joint are shaped to accommodate the new joint components, which are then implanted. The new joint may be held in place with bone cement or by modifications in the metal components that allow bone to grow into them. The final decision of how your joint will be fixated will be made at the time of surgery and depends on many factors, including your bone quality. The incision is closed using staples or sutures.

## A Place for Family

Your family is welcome to accompany you to the hospital and will be instructed to wait in your patient room. The actual surgical procedure may take one to two hours. However, preoperative preparation as well as wake-up time may lengthen your operating room and recovery room stay.

# Total Knee Replacement: After Surgery

## What to Expect

After surgery, you will be taken to the recovery room for a period of close observation - usually 30-45 minutes. Your blood pressure, pulse, respiration, and temperature will be checked frequently. Close attention will be paid to the circulation and sensation in your legs and feet. When you awaken and your condition is stabilized, you will be transferred to your room.

Although circumstances vary from patient to patient, you will likely have some or all of the following after surgery:

1. **A large surgical dressing** will have been applied to the surgical area to maintain cleanliness and absorb any fluid. This dressing is usually changed two days after the surgery by Dr. Larson or his assistant.
2. **An IV**, started prior to surgery, will continue until you are taking adequate amounts of fluid by mouth. When you are taking fluids well, the IV may be changed to a heparin lock-a small sterile tube that allows for easier movement while keeping the vein accessible for antibiotics. Antibiotics are usually administered intravenously for 24 hours to reduce the risk of infection.
3. **Difficulty urinating**. One common side effect of anesthesia is a difficulty in urination after surgery. For this reason, a sterile tube called a catheter is inserted into your bladder to ensure a passageway for urine. This may remain in place for one day.
4. **Compression stockings** (in addition to the elastic hose [TEDS]) will be applied. You will also be given medications and exercises (such as moving your ankles up and down) to help prevent blood clots.
5. **Temporary nausea and vomiting** due to anesthesia or medications. Anti-nausea medications may be given to minimize any nausea and vomiting.
6. **Dietary restrictions**. You will start with a diet of ice chips and clear liquids as tolerated and be allowed to progress as your condition permits.

7. **Coughing and deep breathing exercises** are important to help prevent complications, such as congestion or pneumonia. Inhale deeply through your nose, then slowly exhale through your mouth. Repeat this three times and then cough two times. You will be encouraged to use your incentive spirometer.
8. **A knee immobilizer** may be worn as directed by Dr. Larson.
9. **Continuous passive motion (CPM) machine.** In order to speed your rehabilitation, you may be using a CPM machine, a device that is fit to your leg and is placed in bed with you. It slowly and smoothly bends and straightens your knee. You will use the machine periodically during the day, and it will be adjusted to increase the bend in your knee.
10. **"Up time"** On the first day after surgery, you will be assisted into a chair, provided there are no complications. Physical therapy is started the day of surgery. It is very important for you to have pain medication 30 minutes before going to physical therapy to help you fully participate in the exercises. Please discuss this with your nurse.

## Taking Responsibility

How well you regain strength and motion is, in part, dependent on how well you follow your physical therapy instructions. This part of your rehabilitation is something that you must do for yourself; it is not something that someone else can do for you. If there are no complications, you can expect to be released from the hospital 1 to 2 days after surgery.

## Total Knee Replacement: Physical Therapy

### Exercise Program

When muscles are not used, they become weak and do not perform well in supporting and moving the body. Your leg muscles are probably weak because you haven't used them much due to your knee problems. The surgery can correct the knee problem, but the muscles will only be strengthened through regular exercise. You will be assisted and advised how to do this, but the responsibility for exercising is yours.

Your overall progress, amount of pain, and condition of the incision will determine when you will start going to physical therapy. If no problems arise, your doctor will have you start the day after surgery. While your doctor and therapist may modify the exercise program to fit your particular condition, you will work with physical therapy in the hospital to achieve these six goals:

- Independent in getting in and out of bed.
- Independent in walking with crutches or walker on a level surface.
- Independent in walking up and down three stairs.
- Independent in your home exercise program.
- Able to bend your knee 90 degrees.
- Able to straighten your knee.



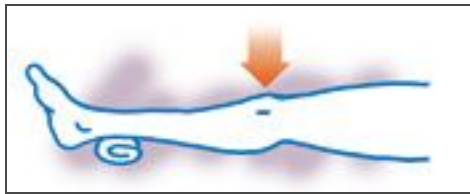
In your physical therapy sessions, you will walk using crutches or a walker, bearing half of your body weight as indicated by your doctor or physical therapist. You will also work on an exercise program designed to strengthen your leg and increase the motion of your knee.

The CPM machine is used to maintain motion. However, this is not a substitute for your exercises. You may wear a knee immobilizer at night for comfort and to help keep your knee straight.

Your exercise program – in the hospital and for weeks at home – will include the following:

### Quadriceps Setting

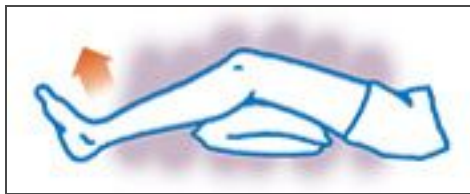
The quadriceps is a set of four muscles located on the front of the thigh and is important in stabilizing and moving your knee. These muscles must be strong if you are to walk after surgery; a "quad set" is one of the simplest exercises that will help strengthen these muscles.



Lie on your back with legs straight, together, and flat on the bed with your arms by your side. Perform this exercise one leg at a time. Tighten the muscles on the top of one of your thighs. At the same time, push the back of your knee downward into the bed. The result should be the straightening of your leg. Hold for five seconds, relax for five seconds; repeat 10 times for each leg over the course of your waking hours.

You may start doing this exercise with both legs the day after surgery before you go to physical therapy. The amount of pain will determine how many you can do, but you should strive to do several every hour. The more you can do, the faster your progress will be. Your nurses can assist you to get started. The diagram above can be used for review.

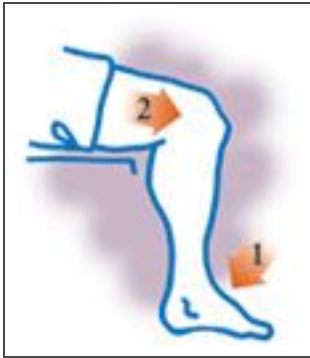
### Terminal Knee Extension



This exercise helps strengthen the quadriceps muscle. It is done by straightening your knee joint.

Lie on your back with a blanket roll under your involved knee so that the knee bends approximately 30 to 40 degrees. Tighten your quadriceps and straighten your knee by lifting your heel off the bed. Hold five seconds, then slowly lower your heel to the bed. You may repeat 10 to 20 times.

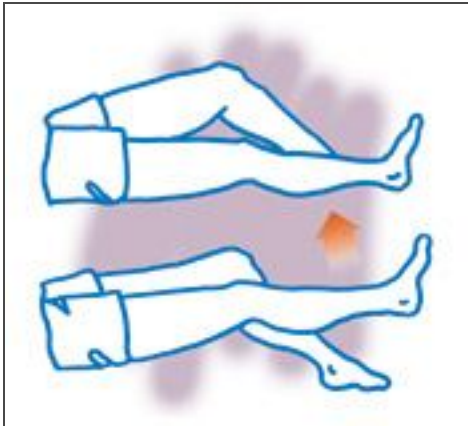
## Knee Flexion



You will need to bend your knee each day. The physical therapist will help you find the best method to increase the bending (flexion) of your knee. You should be able to flex it a little further each day. Your therapist will measure the amount of bending and send a daily report to your doctor.

In addition, your therapist may add other exercises as he or she deems necessary for your rehabilitation.

## Straight Leg Raising



This exercise also helps strengthen the quadriceps muscle.

Bend the uninvolved leg by raising the knee and keeping the foot flat on the bed. Keep your involved leg straight and raise it about seven to 10 inches. Hold for five seconds. Lower the leg slowly to the bed and repeat 10 to 20 times, two to three times a day.

Once you can do 20 repetitions without any problems, you can add resistance (i.e. sand bags) at the ankle to further strengthen the muscles. The amount of the weight is increased in one-pound increments. NOTE: If you feel pain in your involved knee while performing this exercise, decrease the resistance and/or repetitions.

## Use of Heat and Ice

**Ice:** ice may be used during your hospital stay and at home to help reduce the pain and swelling in your knee. Pain and swelling will slow your progress with your exercises. A bag of crushed ice may be placed in a towel over your knee for 15 to 20 minutes. Your sensitivity to cold may be decreased after surgery, so use extra care.

**Heat:** if your knee is not swollen, hot, or painful, you may use heat before exercising to assist with gaining range of motion. A moist heating pad or warm damp towel may be used for 15 to 20 minutes. Your sensitivity to heat may be decreased after surgery, so use extra care.

## Total Knee Replacement: At-Home Guidelines

Upon discharge from the hospital, you will receive instructions in a number of important areas that will ensure that you correctly care for yourself and your new knee. These include:

### Medication

- You will continue to take medications as prescribed by your doctor.
- You will be sent home on prescribed medications to prevent blood clots.
- You will be sent home on prescribed medications to control pain. Plan to take your pain medication 30 minutes before exercising. Preventing pain is easier than chasing pain. If pain control proves to be a problem, call Dr. Larson's office.

### Activity

- Continue to walk with crutches or a walker. You will need these for two to three weeks.
- Bear weight and walk on the surgical leg as directed by Dr. Larson and your level of comfort.
- Walking is one of the better forms of physical therapy for muscle strengthening, but...
- Walking does not replace the exercise program that you are taught in the hospital. The success of the operation depends to a great extent on how well you do the exercises and strengthen weakened muscles.
- Continue to use the CPM machine for two to three weeks.
- Continue with your physical therapy, either at home or in the physical therapy office as directed.
- If excess muscle aching occurs, you should cut back on (but do not stop) your exercises.

### Your Incision

- Keep the incision clean and dry. It must be covered when showering.
- Be alert for warning signs of infection: if you experience any swelling, increased pain, drainage from the incision site, redness around the incision, or you notice a fever, report these to the doctor immediately.
- Generally, the sutures or staples are removed in two weeks.

## Other Considerations

- **Driving:** You should not drive until after your six-week follow-up appointment.
- **Showers:** No showers or tub baths until after sutures or staples are removed. Also, when using heat or ice, be careful not to get your incision wet until after the sutures or staples have been removed.
- **TEDS:** Continue to wear these elastic stockings on both legs until your return appointment.
- **Work:** You can usually return to work within one to two months or as instructed by your doctor.
- **Kneeling:** You can kneel although most patients find it to be uncomfortable.

## Total Knee Replacement: Preventing Infection

If at any time after the surgery (even years later) an infection develops, such as strep throat or pneumonia, notify your physician. Antibiotics should be administered promptly to reduce the risk of a distant infection localizing in the knee area. Antibiotics may also be needed if any teeth are pulled or other dental work is performed. Inform the general physician or dentist ahead of time that you have had a joint replacement. Call Dr. Larson's office (435-774-8512) if you have any questions or need a prescription for antibiotics.

## Follow-Up Appointments

Your first return appointment with Dr. Larson will be scheduled for two weeks after discharge from the hospital. At that time, you will be examined and changes in care will be directed. Subsequent appointments are at six weeks, three months, six months, and one year. You should return every year thereafter for a routine evaluation and x-ray.

During your rehabilitation period, if you have any questions or concerns regarding your total knee replacement, please do not hesitate to call:

- 8:00 am to 5:00 pm, Monday through Friday, please phone Alpine Orthopaedic Specialists at 435-774-8512 or 435-787-2000.
- After 5:00 pm and on weekends and holidays, please phone 435-787-2000 and the answering service will connect you with Dr. Larson or a covering orthopaedic surgeon.

## Total Knee Replacement: Deciding on Knee Replacement

### Is Total Knee Replacement Right for You?

Now that you understand the many facets of having a total knee replacement, you can make a more informed decision about whether the surgery is right for you.

Keep in mind that total knee replacement is an elective operation: it is a matter of quality of life – not a matter of life or death. There are always nonoperative alternatives to help relieve your pain and accommodate your condition, such as medication, lifestyle modifications, and physical therapy.

There are many other things to consider before deciding to have surgery. Although Dr. Larson may recommend knee replacement, you must weigh the potential benefits against the risks and complications. You must also feel comfortable that all of your questions and concerns have been answered, so please ask us any questions you have. The decision to have the operation cannot be made by a doctor; you must consider all the information and what is best for you.

Also consider: the real success of your knee replacement depends largely on you – especially how well you perform your rehabilitation exercises and how diligently you apply the principles of home care and self-limitation. Dr. Larson, the physical therapist, and the nurses are striving to make a painless, functional knee possible for you. Working together with you, we can help you achieve your goal: pain relief, restoration of function, and a return to your favorite activities.

## Recommendations for Activity After Total Knee Replacement According to Knee Society Surveys

Recommended	Allowed with Experience	Not Recommended
Stationary bicycling	Doubles tennis	High-impact aerobics
Croquet	Low-impact aerobics	Baseball
Ballroom dancing	Road bicycling	Basketball
Golf	Bowling	Football
Horseshoes	Canoeing	Gymnastics
Shooting	Hiking	Handball
Shuffleboard	Horseback riding	Hockey
Swimming	Cross-country skiing	Jogging
Doubles tennis	Ice skating	Lacrosse
Walking	Rowing	Racquetball
Low-impact aerobics	Speed walking	Squash
Bowling		Rock climbing
Horseback riding		Soccer
		Singles tennis
		Volleyball

## Total Knee Replacement: Research and Development

Dr. Brad J. Larson has researched and helped to develop new technologies used in knee replacement surgeries. Many of these developments may be used in your surgery. These include:

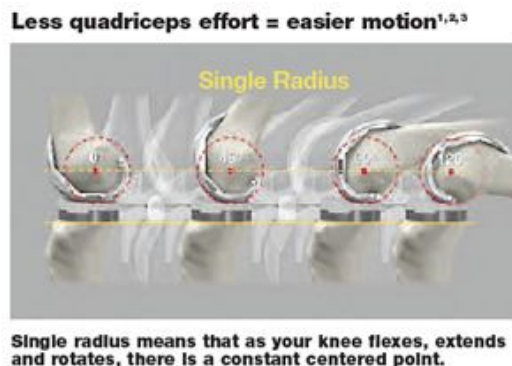
1. Implantation of special prostheses made of new metals that allow your bone to grow into the implants, eliminating the use of bone cement, providing a more long-term bond
2. The design of a new polyethylene (plastic) implant for the tibial tray to improve the stability of your new knee.
3. The use of “gender-specific” implants providing a better fit to your bone.
4. Smaller incisions with muscle-sparing approaches to the knee which lessen the insult to your tissues. This reduces the postoperative pain and allows an earlier return of your strength and function.
5. The utilization of a computer (computer-navigated surgery) to assist in the placement of the implant on the bone. This helps to align your knee to reduce the chance of it wearing out.
6. Dr. Larson has developed a unique pain management protocol to reduce the discomfort after the operation. Using “multi-modal” pain management, or the use of multiple medications, the pain is addressed from different pathways. First, you will receive medication by mouth after you check into the hospital before surgery. The surgery will be performed with the use of a spinal anesthetic, along with a nerve block. Dr. Larson will inject 3 different medications into the back of your knee at the time of the surgery. Additional oral medications will be given after surgery as needed.
7. Dr. Larson has been using a new medicine to help reduce bleeding called Tranexamic acid.

These new technologies and developments have improved the outcomes of total knee replacement. They have allowed a reduction in the discomfort associated with the surgery, a reduction in the bleeding and need for a transfusion, and allowed the patient to rehabilitate in the range of motion and function of the knee, providing improved stability and less wear, thereby, increasing its longevity.

## Total Knee Replacement: Prosthesis

Dr. Larson uses many different types of prosthesis depending on the particular patient's need. The most common prosthesis he uses is the Stryker Triathlon knee system.

### Triathlon® Knee System

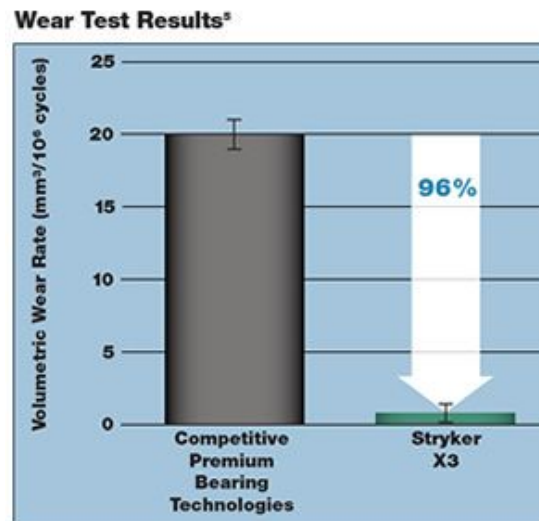


Stryker knee replacements are different than traditional knee replacements because they are designed to work with the body to promote easier motion,<sup>1,2,3</sup> and a study has shown a more rapid return to functional activities after surgery.<sup>2</sup> This is due to the single radius design of the knee implant. Single radius means

that as your knee flexes, the radius is the same, similar to a circle, requiring less effort from your quadriceps muscle.<sup>1,4,7</sup>

Because the thigh muscle (the quadriceps) is attached to your knee, it is unavoidably involved in the surgery. Therefore, the quadriceps muscle can become a source of discomfort or pain during your recovery period. The quadriceps muscle plays an important role in your ability to move your legs so it also has a major impact on your recovery and how quickly you can get back to living your life.<sup>2</sup>

## Knee Implants Designed to Last Longer<sup>5</sup>



Several factors influence how long an implant will continue to perform. Stryker knees are designed to resist wear in many ways — they use advanced bearing surfaces; they're balanced to help avoid excessive stress in any one spot; and, they're sized to better fit your personal anatomy.

The durability of knee implants depends on many things including patient weight and activity level as well as the implant's bearing surface technology. The bearing surface is defined as the two parts of the knee that glide together throughout motion. Stryker developed the Triathlon Knee System with X3 Advanced Bearing technology. Based on laboratory testing, Stryker's Triathlon Knee with X3 technology has demonstrated a lower wear rate which may result in a longer lasting implant.<sup>5</sup> X3 is a patented technology only offered by Stryker.

## Better Results in Knee Replacement<sup>6</sup>

The Triathlon Knee has Better Results than other knee implants when measuring revision rates on the National Joint Registry of England and Wales.<sup>6</sup> Let's take a look at how Stryker's Triathlon Knee with X3 technology compares to other knee implants.

## Revision Rates for the Most Frequently Used Brands



Stryker Corporation or its divisions or other corporate affiliated entities own, use or have applied for the following trademarks or service marks: Stryker, Triathlon, X3. All other trademarks are trademarks of their respective owners or holders.

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- The effect of total knee arthroplasty design on extensor mechanism function, JOA, Vol. 17, Issue 4, June 2002, pp. 416-421.