

A person wearing a green patterned shirt and khaki shorts is walking on a beach at sunset. They are carrying a surfboard under their arm. The background is a warm, golden sunset over the ocean.

stryker

# Mako™ Robotic-Arm Assisted Surgery

for Partial Knee Replacement

**A Patient's Guide**

# Causes of Your Knee Pain

Your joints are involved in almost every activity you do. Movements such as walking, bending and turning require the use of your hip and knee joints. When the knee becomes diseased or injured, the resulting pain can severely limit your ability to move and work.

The knee is the largest joint in the body and is central to nearly every routine activity. The knee joint is formed by the ends of 3 bones:

- ▶ The lower end of the thigh bone, or femur.
- ▶ The upper end of the shin bone, or tibia.
- ▶ The kneecap, or patella.

Thick, tough tissue bands called ligaments connect the bones and stabilise the joint.

## A normal knee

Femur (thigh bone)

Healthy Cartilage

Tibia (shin bone)



## An arthritic knee

Femur (thigh bone)

Diseased Cartilage

Tibia (shin bone)



One common cause of knee pain is Osteoarthritis (OA). OA is sometimes called degenerative arthritis because it is a “wearing out” condition involving the breakdown of cartilage in the joints. When cartilage wears away, the bones rub against each other, causing pain and stiffness.

# What is Partial Knee Replacement?

Partial Knee Replacement (PKR) is a surgical procedure that helps relieve arthritis in one or two of the three compartments of the knee.

With PKR, only the damaged area of the knee joint is replaced, which may help to minimise trauma to healthy bone and tissue.<sup>1</sup>

## There are three types of PKR



### 1. Unicondylar Knee Replacement

**Replacement** is a procedure that replaces only the single affected compartment of the knee, either the medial or lateral compartment.



### 2. Patellofemoral Knee Replacement

is a procedure that replaces the worn patella (the kneecap) and the trochlea (the groove at the end of the thigh bone).



### 3. Bicompartamental

**Knee Replacement** is a procedure that replaces two compartments of the knee, the medial and patellofemoral compartments.

Stryker has worked with surgeons to develop innovative products to be utilised in Partial Knee Replacement. Stryker's robotic-arm assisted technology can be used for partial knee replacement, which is a procedure designed to relieve the pain caused by joint degeneration due to osteoarthritis (OA). By selectively targeting the part of your knee damaged by OA, your surgeon can replace the diseased part of your knee while helping to spare the healthy bone and ligaments surrounding it.

# How Mako Robotic-Arm Assisted Surgery Works



## 1 **Have a Plan Personalised for You**

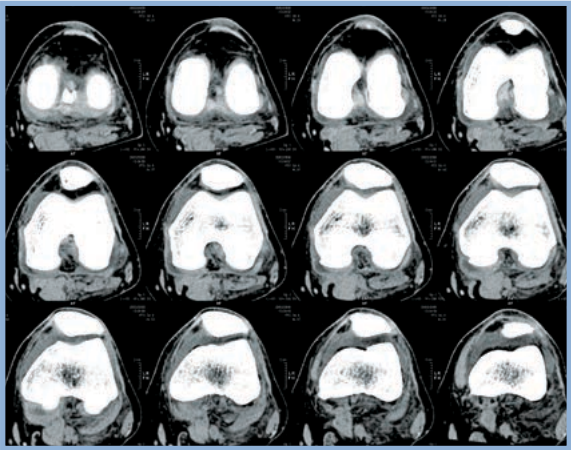
It all begins with a CT scan of your joint that is used to generate a 3D virtual model of your unique anatomy. This virtual model is loaded into the Mako system software and is used to create your personalised pre-operative plan.

## 2 **In the Operating Room**

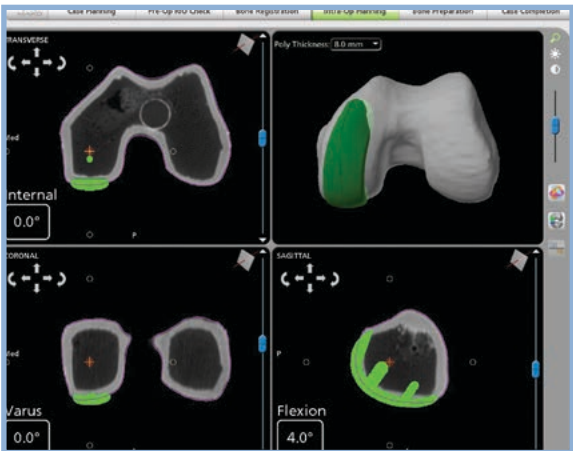
In the operating room, your surgeon will use Mako to assist in performing your surgery based on your personalised pre-operative plan. The Mako system also allows your surgeon to make adjustments to your plan during surgery as needed. When the surgeon prepares the bone for the implant, the Mako system guides the surgeon within the pre-defined area and helps prevent the surgeon from moving outside the planned boundaries. This helps provide more accurate placement and alignment of your implant.<sup>2</sup>

## 3 **After Surgery**

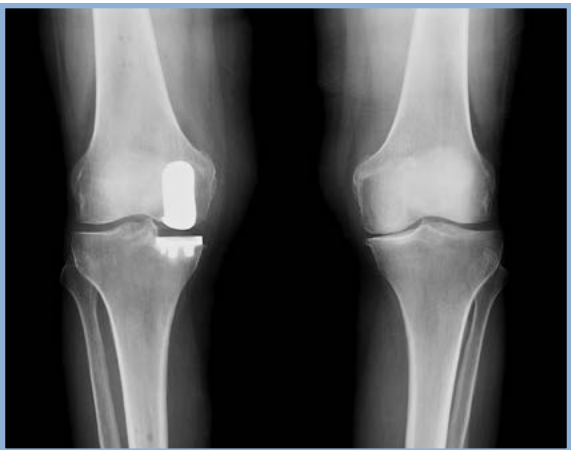
After surgery, your surgeon, nurses and physical therapists will set goals with you to get you back on the move. They will closely monitor your condition and progress. Your surgeon may review an x-ray of your new partial knee with you.



**CT Scan**



**Personalised Planning**



**Post-Operative X-ray**

# Frequently Asked Questions

**Q: How long has the Mako procedure been available?**

**A:** The first Mako procedure was performed in June of 2006.

**Q: Does the Mako Robotic-Arm actually perform the surgery?**

**A:** No, surgery is performed by an orthopedic surgeon, who uses the surgeon-controlled robotic-arm system to pre-plan the surgery and to position the implant . The robotic-arm does not perform the surgery nor can it make decisions on its own or move in any way without the surgeon guiding it. The Mako System also allows your surgeon to make adjustments to your plan during surgery as needed.

**Q: How long do knee implants last?**

**A:** Individual results vary and not all patients will have the same postoperative activity level. The lifetime of a knee replacement is not infinite and varies with each individual. Your doctor will help counsel you about how to best maintain your activities in order to potentially prolong the lifetime of the device. Such strategies include not engaging in high-impact activities, such as running, as well as maintaining a healthy weight. Speak to your doctor to decide if partial knee replacement surgery is right for you.

**STUDIES INDICATE THAT PATIENTS WHO UNDERGO KNEE REPLACEMENT MAY RETURN TO DRIVING IN FOUR TO SIX WEEKS.<sup>3</sup>**



# What to Expect

## in the Weeks Prior to Surgery

Preparing for partial knee replacement surgery begins weeks before the actual surgery. The checklist below outlines some tasks that your surgeon may ask you to complete in the weeks prior to your surgery date.

- Exercise under your doctor's supervision
- Get laboratory tests
- Have a general physical examination
- Complete forms
- Have a dental examination
- Prepare meals
- Review medications
- Confer with a physical therapist
- Stop smoking
- Plan for post-surgery rehabilitative care
- Lose weight
- Fast the night before
- Arrange a pre-operative visit
- Bathe surgical area with antiseptic solution

## It's Your Move.

### Questions to ask your doctor at your next appointment

- 1.** What are the benefits and potential risks involved with partial knee replacement surgery?
- 2.** How long does it typically take to recover from surgery?
- 3.** Is osteoarthritis a factor in my knee pain?
- 4.** Will reducing activity, taking pain or prescription medication, getting injections, or adding physical therapy help ease my pain?
- 5.** Could partial knee replacement help provide me with relief from my knee pain?
- 6.** Am I a candidate for Mako robotic-arm assisted surgery?



## Important information

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### Partial Knee Replacement

**General Indications:** Partial knee replacement is intended for use in individuals with joint disease resulting from degenerative and post-traumatic arthritis, and for moderate deformity of the knee.

**Contraindications:** Partial knee replacement surgery is not appropriate for patients with certain types of infections, any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure or complications in postoperative care, compromised bone stock, skeletal immaturity, severe instability of the knee, or excessive body weight.

**Common Side Effects of Knee Replacement Surgery:** As with any surgery, knee replacement surgery has serious risks which include, but are not limited to, peripheral neuropathies (nerve damage), circulatory compromise (including deep vein thrombosis (blood clots in the legs)), genitourinary disorders (including kidney failure), gastrointestinal disorders (including paralytic ileus (loss of intestinal movement)), vascular disorders (including thrombus (blood clots), blood loss, or changes in blood pressure or heart rhythm), bronchopulmonary disorders (including emboli, stroke or pneumonia), heart attack, and death.

Implant related risks which may lead to a revision of the implant include dislocation, loosening, fracture, nerve damage, wear of the implant, metal sensitivity, osteolysis (localised progressive bone loss), and reaction to particle debris. Partial knee implants may not provide the same feel or performance characteristics experienced with a normal healthy joint.

The information presented is for educational purposes only. Speak to your doctor to decide if joint replacement surgery is right for you. Individual results vary and not all patients will receive the same postoperative activity level. The lifetime of a joint replacement is not infinite and varies with each individual. Your doctor will help counsel you about how to best maintain your activities in order to potentially prolong the lifetime of the device. Such strategies include not engaging in high-impact activities, such as running, as well as maintaining a healthy weight. Ask your doctor if Robotic-Arm Assisted Surgery is right for you.

### References

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1. Arno, S; Maffei, D; Walker, PS; Schwartzkopf, R; Desai, P; Steiner, GC. Retrospective Analysis of Total Knee Arthroplasty Cases for Visual, Histological and Clinical Eligibility of Unicompartmental Knee Arthroplasties. *J. Arthroplasty*. 2011. 26(8): 1396-1403.
2. Anthony, Ian, Bell, Stuart W., Blyth, Mark, Jones, Bryn, MacLean, Angus, Rowe, Philip. Improved accuracy of component positioning with robotic-assisted unicompartmental knee arthroplasty. *The Journal of Bone and Joint Surgery*. Volume 98-A: Number 8. April 20, 2016. pp 627-35.
3. Marecek GS, Schafer MF. Driving after orthopaedic surgery. *J Am Acad Orthop Surg*. 2013 Nov;21(11):696-706.

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Individual results vary. Not all patients will have the same post-operative recovery and activity level. See your orthopaedic surgeon to discuss your potential benefits and risks.

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

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