Stem Cell Surgery
Brings Relief from Knee Pain

Patients afflicted with knee pain can now find hope in a groundbreaking treatment involving cultured stem cells. ASSOCIATE PROFESSOR JAMES HUI, Senior Consultant, Department of Orthopaedic Surgery, tells us more about this innovative treatment.

A Patient’s Case
A forty-year-old patient was an avid hockey player who also jogged regularly. In 2004, she found herself experiencing a gradual onset of pain in her right knee joint that was brought about by the extensive usage of her knees during exercise. She suffered from recurrent swelling and pain.

A magnetic resonance imaging (MRI) scan of her knee showed a large medial femoral condyle ulcer (grade 3), which is a lesion of the articular cartilage. She was treated with an arthroscopic microfracture of the knee, followed by an injection of stem cells three weeks later as an outpatient.

Following treatment, she showed improvements in her pain score and functional outcome, and is now able to resume her active lifestyle. The pain she felt from walking up and down the stairs has reduced.

Knee injuries involving cartilage degeneration are common among the young and active. When a knee injury sets in, it can bring excruciating pain – this can trigger a significant change in lifestyle, a reduction in the quality of life and the loss of man-hours from work.

Cartilage Defects
Cartilage defects have poor healing capacity, and unresolved injury tends to progress to osteoarthritis. Until recently, the treatment for such problems was limited to surgical methods that involved the abrasion and drilling of the subchondral bone in the knee. This technique stimulates repair tissue, which unfortunately degenerates with time. Tissue engineering using stem cells for cartilage regeneration has been found to be promising.

Mesenchymal Stem Cells
Mesenchymal stem cells (MSCs) are adult stem cells mostly found in the bone marrow. The advantages of using MSCs in regenerative medicine include:

- MSCs are able to grow into various mesenchymal cells, such as cartilage
- MSCs secrete bioactive factors that help the healing process in the knee
- MSCs grow faster than cartilage cells, reducing the culture incubation period in the laboratory
- It averts the need to harvest cartilage, lowering donor site morbidity
Stem Cell Treatment

Stem cells extracted from the patient’s own bone marrow are sent for various laboratory tests and cell culture to grow sufficient cells, which are then used to stimulate cartilage regeneration via two techniques – an open or a minimally invasive procedure.

The open technique involves opening the knee joint and implanting the stem cells into the affected area. For the minimally invasive technique, cultured stem cells are injected into the knee three weeks after an initial arthroscopic microfracture, which is a surgical technique to treat damaged areas of the knee’s articular cartilage.

The minimally invasive technique using stem cells to repair and heal degenerated joints was the result of our breakthrough research, which was published in the Journal of Stem Cells in 2007 under the title “Injectable Mesenchymal Stem Cell Therapy for Large Cartilage Defects – a Porcine Model”. A/Prof Hui worked together with principal investigator, Dr Kevin Lee, Associate Consultant, Department of Orthopaedic Surgery, on this research study.

Benefits of Stem Cell Treatment

The advantages of this minimally invasive method are:
• Using stem cells taken from patients’ own bone marrow eliminates potential problems with immunogenicity and rejection
• Injections can be performed on outpatient basis
• Technique does not exclude patients from more invasive procedures in the future should the need arise
• Minimally invasive approach combined with a simple post-operative rehabilitation protocol means that patients can regain full function and return to work sooner

Suitability of Patients

This treatment is suitable for patients:
• Between 12 and 55 years old, and with an injury of not more than 50 percent of the femoral condyle (the “soft bone” covering the knee)

Patients should not undergo this procedure if they have:
• Cardiac (heart) problems or high blood pressure
• Conditions which would pose a problem during anaesthesia
• Severe osteoarthritis

CONTACT US

For enquiries or appointments, contact:

NUH ORTHOPAEDIC SURGERY CLinic
The NUH Orthopaedic Surgery Clinic provides one-stop comprehensive service including diagnostics, treatment and surgery for the bones and joints. Our dedicated team of qualified orthopaedic surgeons specialises in adult reconstructive surgery, orthopaedic sports medicine, orthopaedic trauma, paediatric orthopaedics and spinal surgery.

Location : Kent Ridge Wing 2, Level 3
Appointment Line : 6772 2002
Fax : 6773 4913
Website : www.nuh.com.sg/nuh_ortho/ortho.html

Our Comprehensive Specialist Care

**Adult Reconstructive Surgery**
- Diagnosis and treatment of arthritis (knees, hips, ankles, shoulders and other joints)
- Primary total knee and unicompartmental knee replacement
- Primary total hip replacement and hip resurfacing
- Revision and complex total knee and hip replacements
- Corrective surgery for knee and hip joint deformities
- Minimally invasive and computer navigated surgery
- Musculoskeletal oncology
  - Ministry of Health funded the orthopaedic cryosurgery program for the implementation of novel approaches to the cure or control of bone tumors using hyper-freezing methods (cryosurgery)
  - Only centre of its kind in Southeast Asia

**Orthopaedic Sports Medicine**
- Rehabilitation for:
  - Pain of the knee, hip, shoulder and ankle
  - Injuries of joints, muscles and ligaments
  - Pain and slow recovery after previous surgery
  - Deformity and stiffness of the joints
- Treatment for:
  - Pain and injuries of the knee, hip, shoulder and ankle joints
  - Minimally invasive surgery
  - Arthroscopic surgery
  - Computer-guided surgery
  - Reconstructive surgery for joints, muscles and ligaments
  - Joint and bone preserving surgery
  - Pain and disability after previous surgery
  - Exercise-related fractures
  - Revision surgery for joints, muscles and ligaments

**Orthopaedic Trauma**
- Comprehensive management of fractures and dislocations
  - Fractures and dislocations in adults
  - Osteoporotic fractures and geriatric fractures (fractures in the elderly)
  - Pelvic and acetabular fracture repair and reconstruction
  - Management of open (compound) fractures including flap transfers
  - The Department of Hand and Reconstructive Microsurgery
  - Management of fractures involving the joints (shoulder, elbow, hip, knee, ankle) and their complications

**Paediatric Orthopaedics**
- Corrective Surgery:
  - Upper and lower limb deformities
  - Soft tissue contractures and tendon transfers
  - Lengthening procedures for limb length disorders
  - Idiopathic and neuromuscular scoliosis
  - Chronic paediatric orthopaedic problems (multi-disciplinary follow-up)
  - Paediatric orthopaedic trauma
  - Adolescent sports injuries

**Spinal Surgery**
- Spinal deformity
  - Assessment and treatment of scoliosis (including brace)
  - Thoracoscopic scoliosis operations and conventional scoliosis surgery
  - Instrumentation and fusion of scoliosis
  - Back and neck pain
  - Spine rehabilitation (with Department of Rehabilitation Medicine)
  - Surgical decompression and reconstruction of the spine (fusion or dynamic stabilisation)
  - Minimally invasive and computer-guided surgery
  - Artificial disc replacement

- Spinal tumours
  - Assessment of deformity and neurological involvement
  - Advanced spinal surgery involving stabilisation, decompression, and reconstruction

- Spinal trauma
  - Assessment of spinal trauma
  - Non-operative treatment of spine trauma (brace)
  - Advanced operative treatment of spine trauma
  - Percutaneous procedures (e.g. vertebroplasty, kyphoplasty, facet blocks and nerve root blocks)
New Food Trolley Brings Patients Piping Hot Meals

With the introduction of our new food trolleys to five wards in late January 2008, patients can now enjoy piping hot food served straight from our food trolleys in a shorter time. Previously, our health attendants had to remove the cold items (such as the dessert, milk and salad) from the food tray, re-heat the food separately and re-assemble the cold items onto the tray before serving.

Our health attendants, many of whom are older workers, also find the ergonomically-designed trolley less bulky and easier to manoeuvre. All Main Building wards will be served by the new trolleys before end 2008, while the Kent Ridge Wing wards and intensive care units will have the new trolleys in 2009.

"Last time, I could hear the food trolley come and park in front of my door, and the lady would plug it in and heat the trolley to make the food warm. Patients had to wait about 20 minutes for their food to be served. Now, meals are served as soon as the new food trolley, almost similar to those from SIA, arrives. The food is very tasty and the soup very hot. I finished everything!"

– Mr S G Phua, a patient

New Head for NUH Nephrology Division

Professor A Vathsala has been appointed Head, Division of Nephrology, Department of Medicine and Director of the Adult Renal Transplantation Programme. She has held various appointments in both clinical and academic areas, and has vast experience in renal medicine research. Besides being a Senior Consultant, Prof Vathsala is also an academic staff at the National University of Singapore’s (NUS) Yong Loo Lin School of Medicine.

“There is a long tradition of nephrology at NUH. I would like to build on this foundation and develop academic renal medicine further at NUH. This will be obviously a team effort working together with all the nephrologists, nurses and other healthcare professionals to take the subspecialties of dialysis and transplantation to the next level. My special interest is teaching and I am enthusiastic about developing the best training program in nephrology in Singapore in the near future."

– Prof A Vathsala

NUH Corporate Review 2007 Available Online

Theme ‘In Focus: Advancing Excellence in Medical Care, Research & Education’, our Corporate Review captures the milestones for the year and the exciting new developments as NUH embarks on another chapter of its growth!

To view, visit our website at www.nuh.com.sg/aboutUs/corporatePublications/aboutUs_corporatePublications_corporateReview.htm.