

# Knee pain and osteoarthritis (Knee OA) treatment research

---

[openaccessgovernment.org/article/knee-pain-osteoarthritis-knee-oa-treatment-research/163045](https://openaccessgovernment.org/article/knee-pain-osteoarthritis-knee-oa-treatment-research/163045)

6 July 2023

## **Professor Shaw-Ruey Lyu from the School of Medicine, Tzu-Chi University, discusses Knee Pain and Osteoarthritis (Knee OA) Treatment Research, in particular Knee Health Promotion Option (KHPO)**

---

Starting in 2002, I conducted a series of studies<sup>(1-3,5,6,8,9)</sup> to investigate medial abrasion phenomenon (MAP) as a cause of knee OA. I found a high correlation between medial plica-related MAP and knee OA. MAP would elicit lifelong interplay between a pathologic medial plica and the facing medial femoral condyle, and therefore plays a role in the pathogenesis of knee OA both physically and chemically.<sup>(10,11,13)</sup> Consequently, I have developed the procedures of arthroscopic medial release (AMR)<sup>(4)</sup> and the concept of arthroscopic cartilage regeneration facilitating procedure (ACRFP)<sup>(7,15)</sup> for the treatment of knee OA.

Moreover, the concurrent execution of the removal of MAP and conventional surgical procedures such as osteotomy or arthroplasty could lead to better outcomes.<sup>(14)</sup> The clinical applications of this concept at our practice have won positive patient feedback which led me to develop in 2009 a multidisciplinary treatment option, which I called the “knee health promotion option (KHPO)<sup>(12)</sup>”, for the comprehensive management of knee OA from prevention to treatment based on my discovery that MAS is a cause of knee OA.

While not entirely in agreement with the traditionally and commonly accepted treatment guidelines and protocols issued by major governing bodies, our treatment has been wildly successful clinically as evidenced by the long line of patients on the waiting list to be seen at our clinic. My protocol and my arthroscopic surgery have so far successfully treated thousands of knee OA patients, saving them from knee replacements that otherwise ensue under the traditional treatment protocol.

### **The ‘Knee Health Promotion Option’ conceptualization**

---

In the early 2000, I accidentally found the ‘hidden lesions’ related to the medial abrasion phenomenon (MAP) caused by the medial plica in the knee of a knee OA patient. After some investigations of the hidden lesions<sup>(1-3,5,6,8,9)</sup> I designed a novel arthroscopic medial release technique to remove the MAP and cured some knee OA patients.<sup>(4)</sup> These surprising events persuaded me to design more studies to investigate the relationship of MAP with knee OA. And, in 2012, I published the technique and its outcome of a novel concept of the arthroscopic cartilage regeneration facilitating procedure (ACRFP).<sup>(7)</sup>

This concept emphasizes that the three sequelae of MAP: inflammation, focal abrasion, and increased static pressure between cartilage will cause damage to the cartilage. A timely ACRFP to remove these three detrimental factors from the knee cavity could make it hospitable for cartilage to regenerate.<sup>(15)</sup> Based on this theory, KHPO was conceptualized to provide comprehensive management of knee OA by smart knee care for prevention in early-stage OA, preservation arthroplasty for cure in moderate-stage OA, and precision total knee replacement for salvage in late-stage OA.<sup>(12)</sup>



Watch Video At: <https://youtu.be/wO8pkPi5eS4>

## Five key ways you can look after your knees and avoid Knee Pain and Osteoarthritic change

---

- To renew your knowledge that knee OA is not an irreversible degenerative process, rather, it is preventable and curable.
- To realize that the three sequelae of MAP: focal abrasion, inflammation, and therefore increased static pressure between cartilage are the main causes of cartilage damage.
- After understanding the mechanism of how MAP damages cartilage and causes pain, you can employ smart knee care to avoid knee pain and modify the natural course of knee OA.
- The first part of smart knee care is to modify daily activities to avoid MAP by decreasing the frequency, speed, and time of bending the knee.
- The second part of smart knee care is to do 3 easy home exercises to increase muscle strength around the knee and increase flexibility of the knee to decrease static pressure between cartilage: leg raise, knee hug, and knee press

## Motivations for research on Knee Pain and Osteoarthritis

---

Although knee OA is a common progressive musculoskeletal condition and remains an immense public health concern worldwide, its pathophysiology is not well understood. A lot of work has been put into searching for the etiologic factors of knee OA and multiple hypotheses have been proposed, but still there is not a clear understanding of its natural course. Based on those hypotheses, a wide variety of treatments have been developed, such as pharmacological therapy, biologic intra-articular injection therapies (e.g., platelet-rich plasma, cell-based treatment options including bone marrow mesenchymal stem cells and autologous adipose stem cells), weight-shifting modalities (e.g., knee brace, wedge insole), or surgical procedures (e.g., arthroscopic debridement, microfracture, corrective osteotomy, autologous or allogeneic cartilage transplantation, and chondrocyte transplantation).

But all such proposed treatments provide only symptomatic relief rather than preventative or regenerative outcomes, and they may eventually lead the sufferers to total knee arthroplasty. The inconsistency and inconclusiveness of these treatments in demonstrating disease modification in the process of chondral degradation are due to a lack of understanding of the initiating events that result in cartilage degradation.

Having some experience in treating complications of knee replacement that make old patients lead miserable daily living for the rest of their lives, I decided to search for the cause of knee OA and create an alternative, novel treatment for knee OA so that patients may be more likely to keep their natural knees while their knee pains are relieved and their quality of life improved.

## **Upcoming Knee Pain and Osteoarthritis projects in 2024**

---

My upcoming Knee Pain and Osteoarthritis projects in 2024 include a prospective study to compare the outcome of ACRFP and ACRFP + cell therapy. Another is the development of a wearable device system to assist the implementation of smart knee care for the prevention of knee OA. A third will be the promotion of KHPO to the global society.

## **References**

---

1. Lyu SR, Hsu CC, Medial plicae and degeneration of the medial femoral condyle. *Arthroscopy*. 2006 Jan;22(1):17-26.
2. Shaw-Ruey Lyu, Jeh-En Tzeng, Chia-Yuan Kuo, Ai-Ru Jian, De-Shin Liu  
Mechanical strength of mediopatellar plica- The influence of its fiber content *Clinical Biomechanics*, Volume 21, Issue 8, October 2006, Pages 860-863.
3. Shaw-Ruey Lyu, Relationship of medial plica and medial femoral condyle during flexion. *Clinical Biomechanics*, 2007, Volume 22, Issue 9, Pages 1013-1016.
4. Shaw-Ruey Lyu, Arthroscopic medial release for medial compartment osteoarthritis of the knee, *J Bone Joint Surg Br*, September, 2008, Vol 90-B, issue 9, Pages 1186-1192.

5. Lyu SR, Chiang JK, and Tseng CE, Medial plica in patients with knee osteoarthritis: a histomorphological study, *Knee surgery, sports traumatology, arthroscopy: official journal of the ESSKA*, 2010,18(6):769-76.
6. Wang, H. S., Kuo, P. Y., Yang, C. C., & Lyu, S. R. (2011). Matrix metalloprotease-3 expression in medial plica and pannus-like tissue in knees from patients with medial compartment osteoarthritis. *Histopathology*, 2011, 58(4), 593-600.
7. Shaw-Ruey Lyu, Chia-Chen Hsu and Chih-Wen Lin, Arthroscopic cartilage regeneration facilitating procedure for osteoarthritic knee. *BMC Musculoskeletal Disorders* 2012, 13:226, <http://www.biomedcentral.com/1471-2474/13/226>.
8. Chih-Chang Yang, Cheng-Yu Lin, Hwai-Shi Wang, Shaw- Ruey Lyu, Matrix Metalloproteases and Tissue Inhibitors of Metalloproteinases in Medial Plica and Pannus-like Tissue Contribute to Knee Osteoarthritis Progression. *PLoS ONE* 8(11): e79662. doi:10.1371/journal.pone.0079662.
9. D.S. Liu, Z.W. Zhuang, S.R. Lyu. Relationship between medial plica and medial femoral condyle—a three- dimensional dynamic finite element model. *Clinical Biomechanics*. Volume 28, Issues 9–10, November– December 2013, Pages 1000–1005.
10. Shaw-Ruey Lyu, Ching-Chih Lee, Chia-Chen Hsu, Medial abrasion syndrome: a neglected cause of knee pain in middle and old age, *Medicine*, 94(16), e736, 2015.
11. S.R. Lyu, D.S. Liu, C.E. Tseng, H.S. Wang and L.K. Chau, Role of medial abrasion phenomenon in the pathogenesis of knee osteoarthritis, *Medical Hypotheses*, 85(2), 207-211, 2015.
12. S.R. Lyu, Knee health promotion option for knee osteoarthritis: a preliminary report of a concept of multidisciplinary management, *Healthy Ageing Research*, 4-34, 2015.
13. Tsung-Chiao Wu, Chuan-Hsin Yen, Shaw-Ruey Lyu, Shuo- Suei Hung. Modification in foot pressure and gait pattern after arthroscopic cartilage regeneration pacilitating procedure (ACRFP) in patients with osteoarthritis of knee. *Journal of Mechanics in Medicine and Biology* Vol. 19, No. 2 (2019) 1940026.
14. Lyu S-R, Hsu C-C, Hung J-P. Medial abrasion syndrome: a neglected cause of persistent pain after knee arthroplasty. *J Orthop Surg Res*. 2021;16(1).
15. Lyu SR, Hsu CC, Hung JP, Chou LC, Chen YR, Lin CW. Arthroscopic cartilage regeneration facilitating procedure: A decompressing arthroplasty for knee osteoarthritis. *Medicine (Baltimore)*. 2022 Sep 30;101(39):e30895. doi: 10.1097/MD.0000000000030895. PMID: 36181017; PMCID: PMC9524980.

Acknowledgment: Publication of the present article was supported by the [BIONET Corp.](#)

Please Note: This is a Commercial Profile



This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#).