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2025

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Intra
Articular
Treatment



Post-operative injection of hydrolyzed collagen peptides shows anti-inflammatory effect in patients with FAI improving the early recovery

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Orthopedics and Traumatology Departement
Istituto Ortopedico Rizzoli
Università di Bologna (Italy)



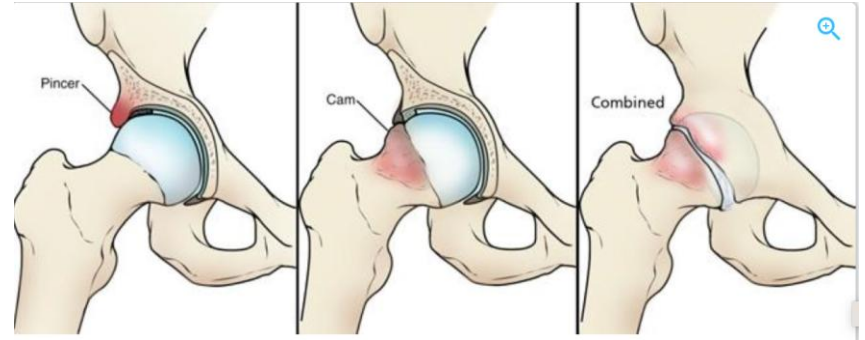


FEMORO-ACETABULAR IMPINGEMENT (FAI)

DYNAMIC condition due to shape mismatch at the hip joint

Abnormal **CONTACT** between the femoral head-neck junction and the acetabulum

Typical in **YOUNG** and **ATHLETIC** patients



3 types of FAI



CAM -TYPE



Bony **bump**

Cartilage damage and
delamination

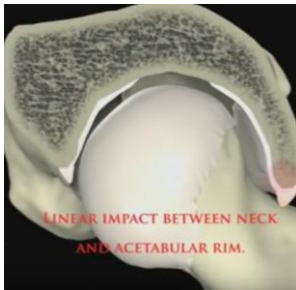
Young athletic males
(soccer, martial arts)



Gron pain, limited ROM



PINCER - TYPE



Acetabular **over-coverage**
of femoral head

Detachment of the
labrum

Female, joint hypermobility

Stiffness, 'catching'
sensation



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MIXED





MECHANISM OF DAMAGE

Abnormal contact between the femur and the acetabulum



Repetitive motion leading to continuous **insult**



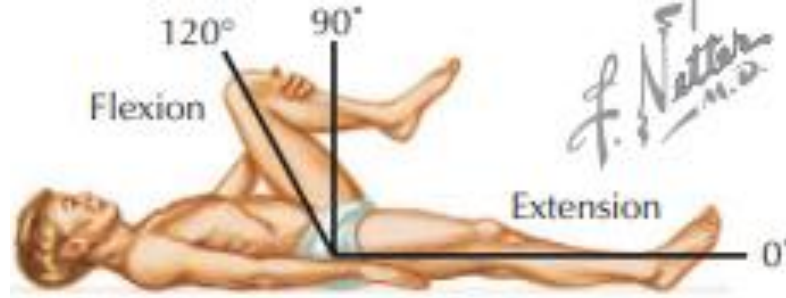
Labral and **chondral** damage



PAIN AND FUNCTIONAL LIMITATION

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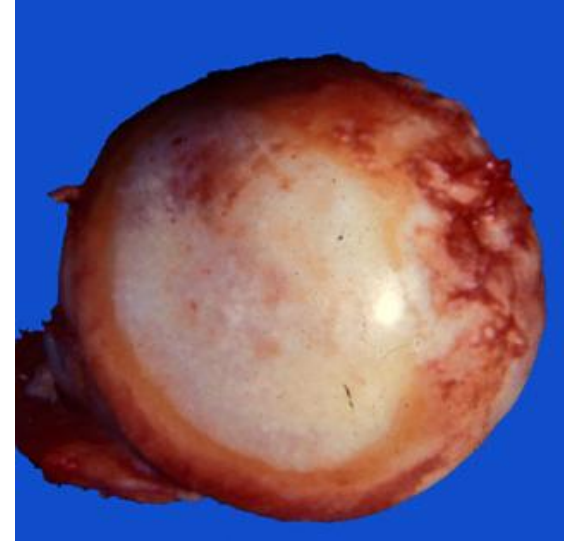
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**LIMITED RANGE OF
MOTION
(ROM)**



**PAIN
C-SIGN**



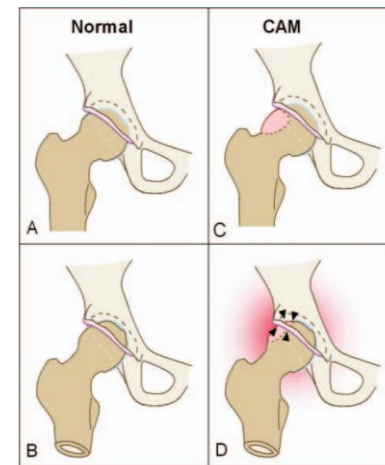
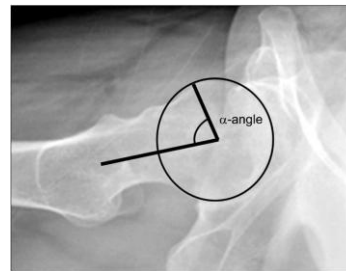
**ARTICULAR CARTILAGE
DAMAGE**

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Cam impingement causes osteoarthritis of the hip: a nationwide prospective cohort study (CHECK)

[Rintje Agricola](#)¹ · [Marinus P Heijboer](#)¹ · [Sita M A Bierma-Zeinstra](#)^{1,2} · [Jan A N Verhaar](#)¹ · [Harrie Weinans](#)^{1,3} · [Jan H Waarsing](#)¹

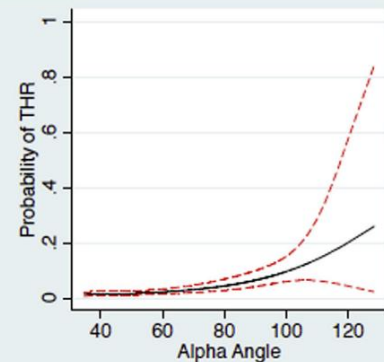
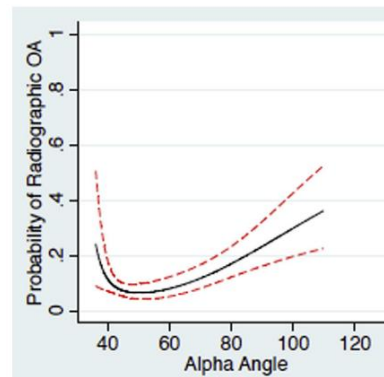
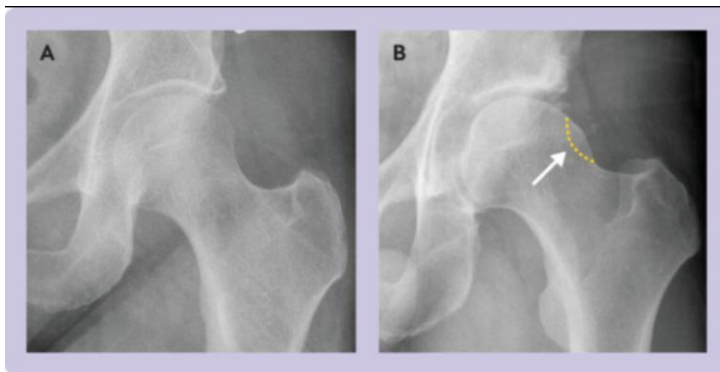


Moderate cam-type $\alpha > 60^\circ \rightarrow$ **OR 3.67** (1.68 to 8.01)
Severe cam-type $\alpha > 83^\circ \rightarrow$ **OR 9.66** (4.72 to 19.78)

FOR END STAGE ORTHEOARTITIS AT 5 YEARS FOLLOW-UP



Alpha angle and OA



THE BIGGER ALPHA ANGLE → THE HIGHER RISK OF OA and THR

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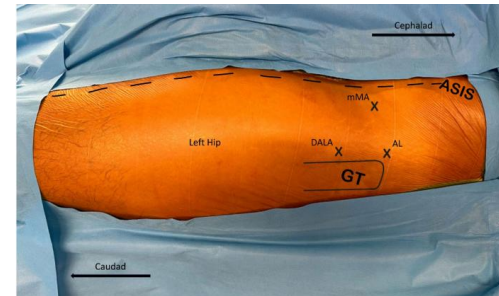
MANAGEMENT OF FAI

3-6 MONTHS
CONSERVATIVE
TREATMENT

(NSAIDs, Physical Therapy)



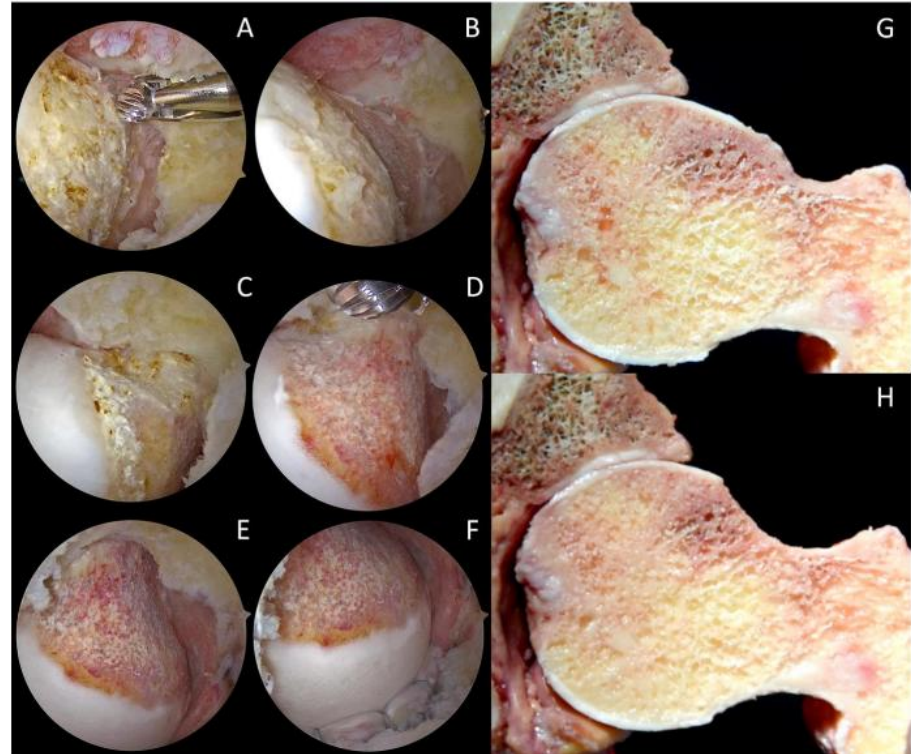
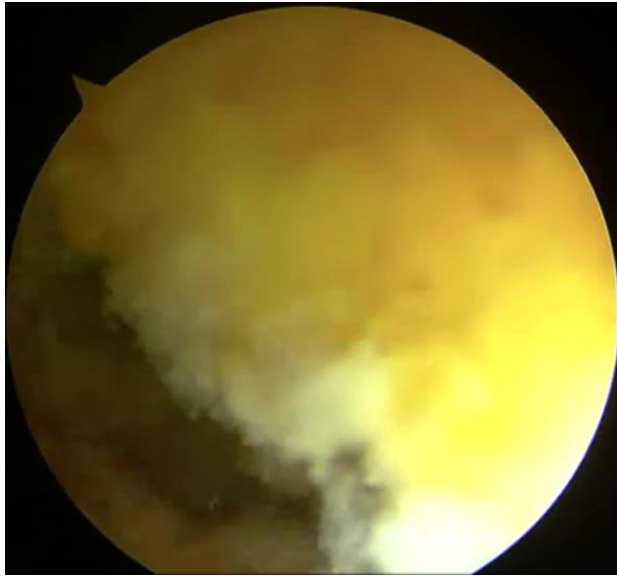
ARTHROSCOPIC SURGERY



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INTRARTICULAR INJECTION

> [Arthroscopy](#). 2015 Sep;31(9):1722-7. doi: 10.1016/j.arthro.2015.03.023. Epub 2015 May 14.

Best Practices During Hip Arthroscopy: Aggregate Recommendations of High-Volume Surgeons

Asheesh Gupta ¹, Carlos Suarez-Ahedo ¹, John M Redmond ¹, Michael B Gerhardt ²,
Bryan Hanypsiak ³, Christine E Stake ¹, Nathan A Finch ¹, Benjamin G Domb ⁴

Type of Injection	No. of Surgeons	% of Surgeons
Local anesthetic	15	56
Platelet-rich plasma	2	7
No injection	10	37

Local anesthetic +/- cortisone
Cytotoxic effect on chondrocytes

PRP
decrease postoperative ecchymosis and **edema**
improve early outcomes

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BIOLOGICAL ADJUVANTS: BIMAC and PRP

Hip Arthroscopy With Bone Marrow Aspirate
Injection for Patients With Symptomatic Labral Tears
and Early Degenerative Changes Shows Similar
Improvement Compared With Patients Undergoing
Hip Arthroscopy With Symptomatic Labral Tears
Without Arthritis



Molly A. Day, M.D., A.T.C., Kyle J. Hancock, M.D., Ryan S. Selley, M.D., Reena Olsen, B.S.,
Anil S. Ranawat, M.D., Benedict U. Nwachukwu, M.D., M.B.A.,
Bryan T. Kelly, M.D., M.B.A., and Danyal H. Nawabi, M.D., F.R.C.S.

2023

Platelet-Rich Plasma Augmentation for
Hip Arthroscopy



Sandeep Mannava, M.D., Ph.D., Jorge Chahla, M.D., Ph.D., Andrew G. Geeslin, M.D.,
Mark E. Cinque, B.S., Kaitlyn E. Whitney, B.S., Thos A. Evans, M.D.,
Salvatore J. Frangiamore, M.D., M.S., George LeBus, M.D., Jonathan Godin, M.D., M.B.A.,
Robert F. LaPrade, M.D., Ph.D., and Marc J. Philippon, M.D.

2017

Arthroscopy
Techniques

HYDROLIZED COLLAGENE PEPTIDES LWPs

- **Oral ingestion**

traditionally the most common way of supplementing with collagen peptides



- **Direct injection**

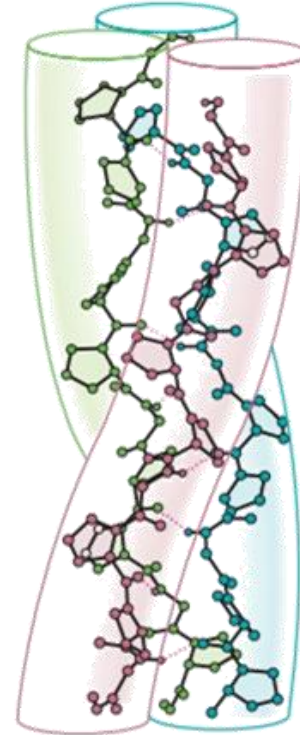
Formulation developed to overcome the limitation of absorption and distribution





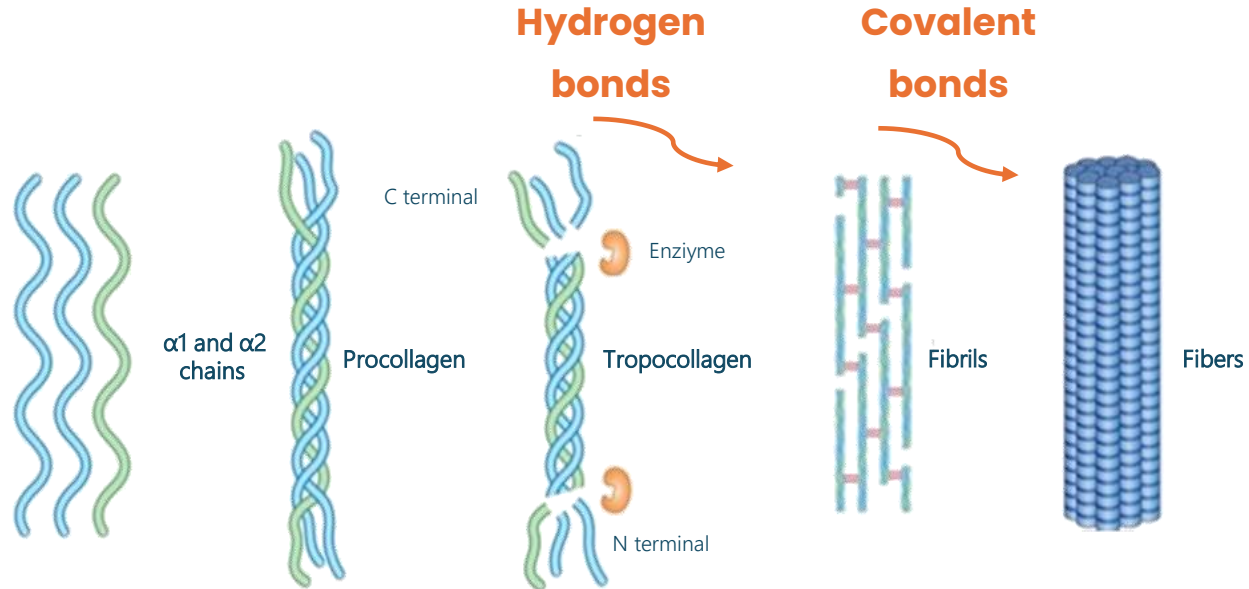
COLLAGEN vs LWPs

- Collagen accounts for **over 30%** of the **total protein** content in humans
- Constitutes the fundamental **structural element** of **connective tissues**
- **3** very long left-handed amino acid chains (**Tropocollagen**)





COLLAGEN VS LWPs



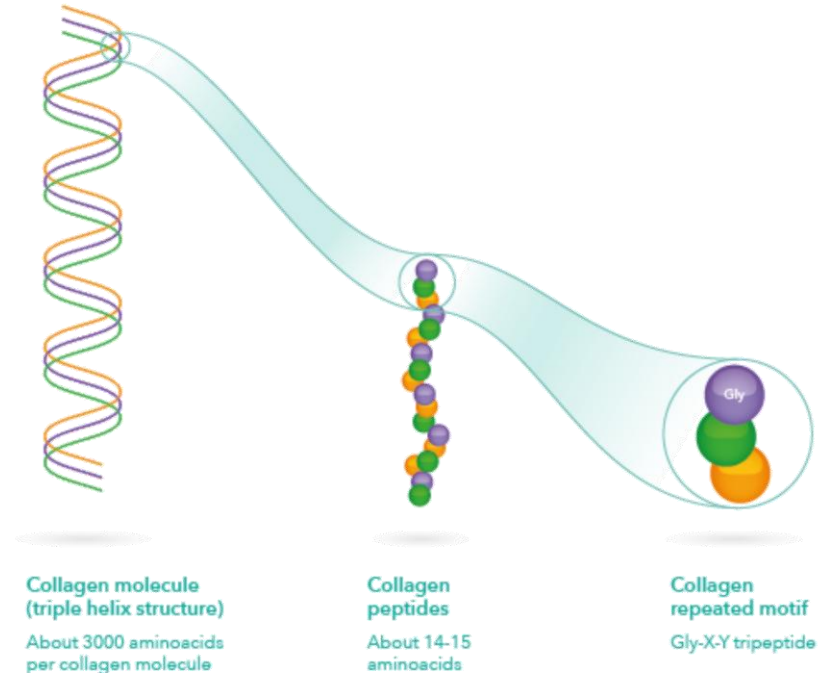


COLLAGEN vs VWPs

Collagen peptides → obtained by enzymatic **hydrolysis** of collagen

Size → determines **bioavailability** and **absorption** in the body.

LWPs → MW < **3,000 Daltons** are highly **soluble** in water

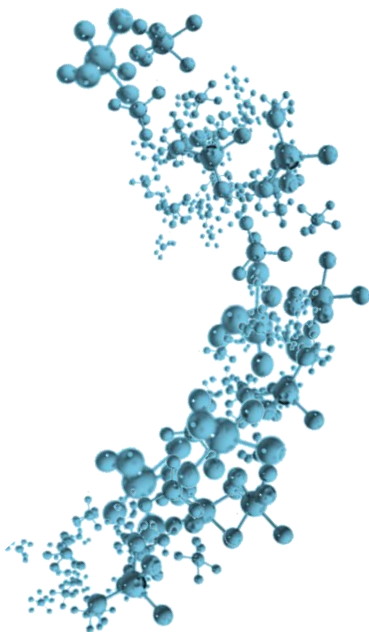


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LWPs



JOINTS

*Recovery of articular cartilage
and improvement of the entire joint compartment*

TENDONS & LIGAMENTS

Reinforcement of tendons and ligament structures

MUSCLES

Muscle mass increasing and fat decreasing

BONE

Improvement of bone density and flexibility

SKIN & DERMIS

Wrinkle reduction, improvement of dermis elasticity and density

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LWPs COMBINED ACTION



INFLAMMATION AND PAIN
REDUCTION

EXTRA-CELLULAR MATRIX REINFORCEMENT

PRO-REGENERATIVE ACTION

CARTILAGE AND CONNETTIVE TISSUES
PROTECTION

IMPROVEMENT OF JOINT MOBILITY



FORMULATION

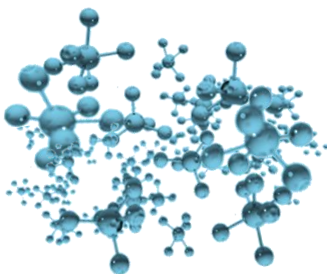
Vitamin C

- Fundamental co-factor for collagen biosynthesis
- Strong antioxidant action

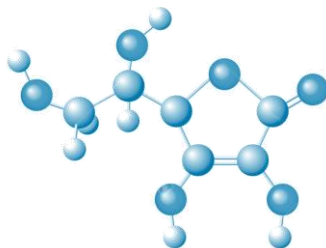


Magnesium

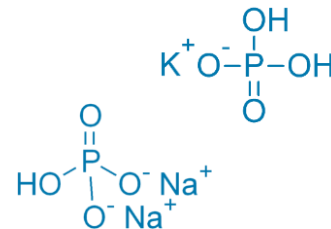
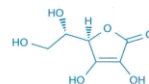
- Promotes cell adhesion and cartilage formation



LWPs < 3 kDa



Ascorbic Acid



PBS

*Phosphate-
buffered saline
(PBS)
liquid vehicle*

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CLINICAL STUDIES ON LWPs

► J Clin Med. 2019 Jul 4;8(7):975. doi: [10.3390/jcm8070975](https://doi.org/10.3390/jcm8070975)

Intra-Articular Injection of Hydrolyzed Collagen to Treat Symptoms of Knee Osteoarthritis. A Functional In Vitro Investigation and a Pilot Retrospective Clinical Study

[Paola De Luca](#)^{1,†}, [Alessandra Colombini](#)^{1,†}, [Giulia Carimati](#)², [Michelangelo Beggio](#)³, [Laura de Girolamo](#)^{1,*}, [Piero Volpi](#)²



Journal of
Clinical Medicine



**3 intra-articular knee LWPs
injections**

(4 mg LWPs)

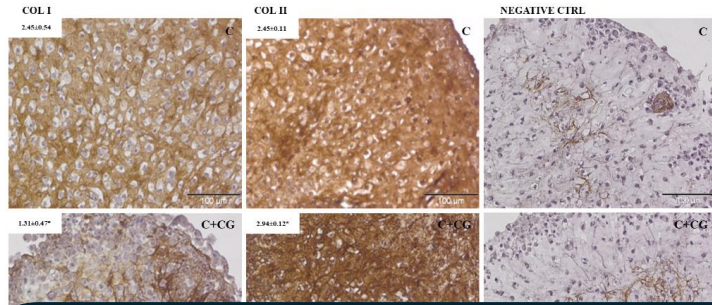
0 -15 -45 days

In **vitro** and in **vivo** investigation



In vitro **LWPs** may help **chondrocytes**

- produce **hyaline cartilage**
induced type-II collagen
inhibited type-I collagen deposition



Type I Collagen (90% of total)

Where: Skin, bones, tendons, ligaments

Main function: **strength** and **structure** of tissues.

Type II Collagen

Where: **articular cartilage**

Main function: **elastic** and **shock-absorbing** structure of cartilage.

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	Baseline (Before First Injection)	T1 (15 Days after First Injection)	T2 (30 Days after First Injection)	FUP (About 6 Months after First Injection)	FUP vs. Baseline (%)
Time (days)	N/A	14.5.1 ± 2	22.9 ± 11.2	172.1 ± 22.7	N/A
VAS at rest	6 (22.5)	0 (6.25)	0 (5)	0 (10)	-100%
VAS when moving	50 (23.25)	30 (27.75)	21 (21.25)	22.5 (20)	-55%
Lequesne Index	9 (3.25)	7 (5.25)	3.5 (5.25)	5 (5)	-44%
WOMAC (pain)	4.5 (3.25)	2 (3)	1 (2.25)	1 (2.25)	-77.8%
WOMAC (stiffness)	2 (2.25)	2 (2.25)	1 (2.25)	0.5 (1.25)	-75%
WOMAC (physical function)	18 (13)	13.5 (12.5)	5 (10.25)	5 (7)	-72.2%
WOMAC (Total)	23.5 (14.5)	17 (15.75)	8 (13.75)	6.5 (9.25)	-72.3%

Time is provided as mean ± SD; all other values are provided as median (IQR).

LWPs are a safe and **effective adjuvant** in the treatment of symptomatic knee OA by intra-articular injection.

No literature studies concerning the administration of **collagen peptides** at the end of hip or knee **arthroscopy**.

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OUR EXPERIENCE WITH LWPs

ORIGINAL PAPER

Journal of Experimental Orthopaedics WILEY

Post-operative injection of hydrolyzed collagen peptides shows anti-inflammatory effect in patients with femoroacetabular impingement improving the early recovery

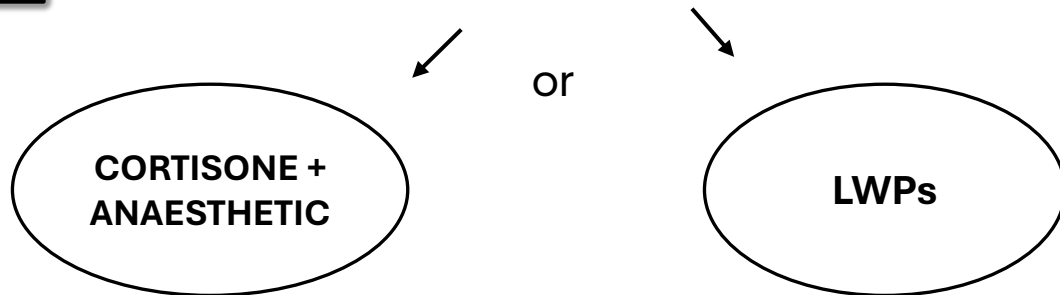
Enrico Tassinari¹ | Andrea Minerba² | Tommaso Basile² |
Alessio Bucciarelli³ | Francesco Traina² | Brunella Grigolo³ |
Stefano Zaffagnini¹ | Eleonora Olivetto³

**Comparative, prospective,
randomized, blinded study**

Decembre 2024

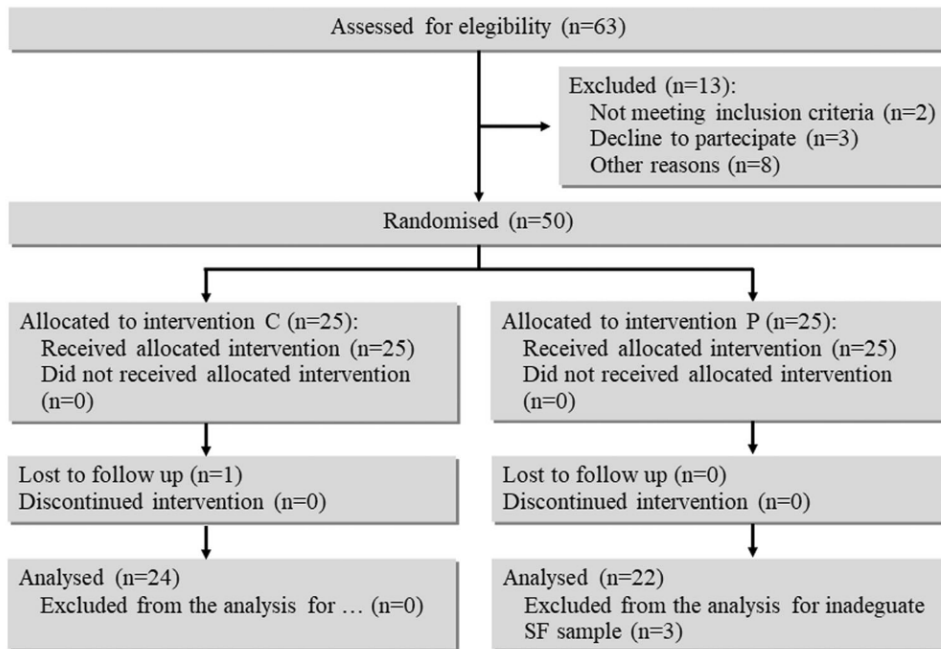
To compare in terms of

POST OPERATIVE PAIN RELIEF and
HIP FUNCTIONAL IMPROVEMENT the use
of intrarticular injection of



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INCLUSION CRITERIA

18–65 years

Clinical diagnosis of symptomatic FAI.

EXCLUSION CRITERIA

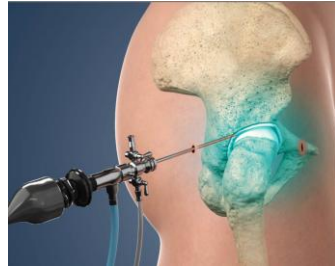
Displastic hip

OA Tonnis ≥ 2

Systemic diseases

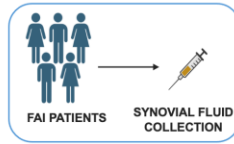
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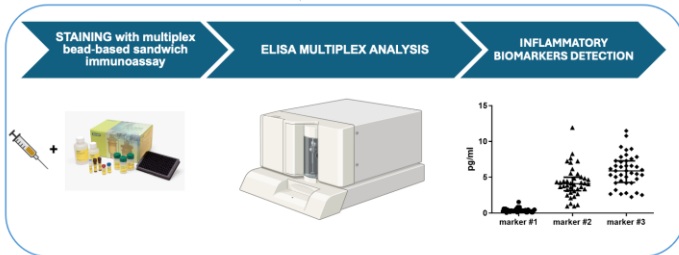


METHYLPREDNISOLONE 40 mg/mL (1 mL)
NAROPINA 0.75% (1 mL)

LWPs low molecular weight collagen
peptides 5 mg/mL (2mL)



SINOVIAL FLUID COLLECTION



PELVIS X-Ray
Evaluate OA signs

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Variable	Unit	Cortisone	Peptides
Male/female	Number (%)	11 (45.83)/13 (54.17)	16 (69.56)/7 (30.43)
Age (mean ± SD)	Years	37.00 ± 11.15	33.30 ± 10.24
BMI (mean ± SD)	Kg/m ²	24.42 ± 5.02	24.23 ± 4.18
Right/left hip	Number (%)	10 (41.67)/14 (58.33)	15 (65.22)/8 (34.78)
Acetabular chondropathy (yes/no)	Number (%)	23 (95.83)/1 (4.17)	19 (82.61)/4 (17.39)
Femoral chondropathy (yes/no)	Number (%)	18 (75.00)/6 (25.00)	13 (56.52)/10 (43.48)
TöNNIS scale (0–2)	Scale value, number (%)	0, 10 (41.67) 1, 12 (50.00) 2, 2 (8.33)	0, 15 (68.18) 1, 7 (31.81) 2, 0 (0.00)
Labrum suture (yes/no)	Number (%)	14 (58.33)/10 (41.67)	15 (65.27)/8 (34.78)
Labrum shaving (yes/no)	Number (%)	9 (37.50)/15 (62.50)	7 (30.43)/16 (69.56)
Microfractures (yes/no)	Number (%)	3 (12.50)/21 (87.50)	1 (4.35)/22 (95.65)
Acetabuloplasty (yes/no)	Number (%)	10 (41.67)/14 (58.33)	6 (26.10)/17 (73.91)
Femoroplasty (yes/no)	Number (%)	20 (83.33)/4 (16.67)	23 (100.00)/0 (0.00)

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To evaluate

- **POST OPERATIVE PAION RELIEF**
- **HIP FUNCTIONAL IMPROVEMENT**

HOOS test

QoL

Stiffness

Function

Sport

VAS scale

FOLLOW UP

- Baseline
- 1 month
- 6 months

HOOS Questionnaire

Name: _____ Age: _____ Gender: _____

Date of assessment: _____

Instructions: This survey asks for your view about your hip. This information will help us keep track of how you feel about your hip and how well you are able to do your usual activities.

Answer every question by ticking the appropriate box, only one box for each question. If you are uncertain about how to answer a question, please give the best answer you can.

Symptoms: These questions should be answered thinking of your hip symptoms and difficulties during the **last week**.

S1. Do you feel grinding, hear clicking or any other type of noise from your hip?

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

S2. Difficulties spreading legs wide apart

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

S3. Difficulties to stride out when walking

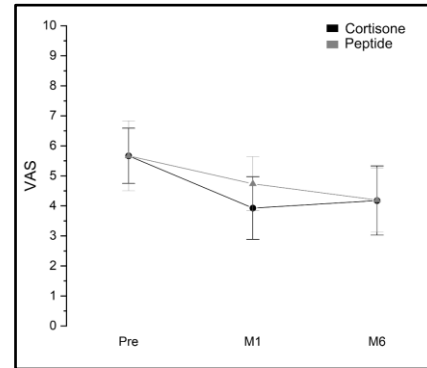
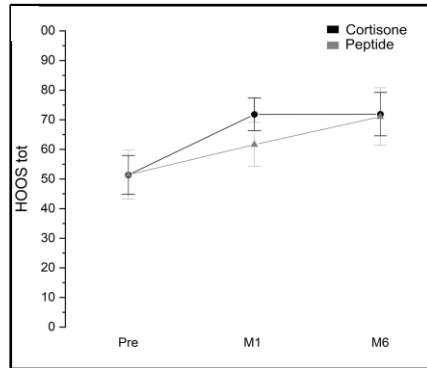
☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

Stiffness: The following questions concern the amount of joint stiffness you have experienced during the **last week** in your hip. Stiffness is a sensation of restriction or slowness in the ease with which you move your hip joint.

S4. How severe is your hip joint stiffness after first wakening in the morning?

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

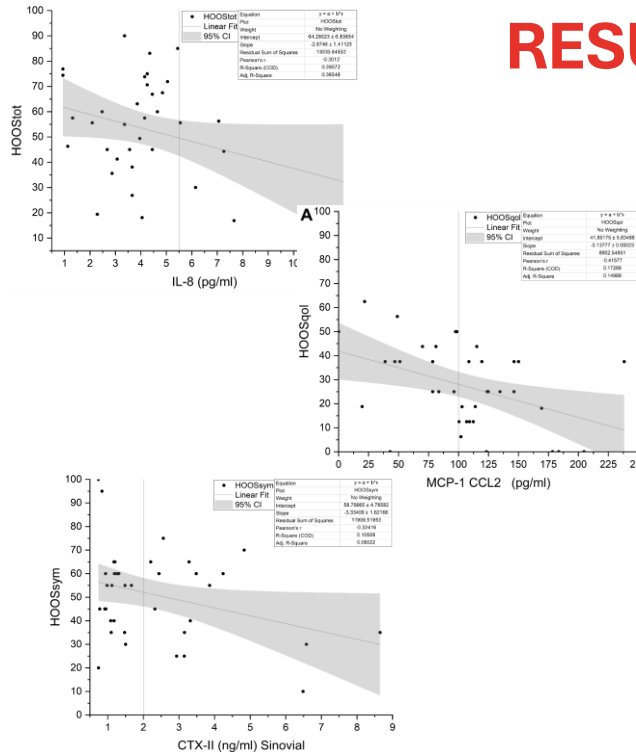
RESULTS



- **CORTISON** or **COLLAGEN PEPTIDES** treatment at **6 months** did not show **any statistically significant** difference in terms of hip function based on **HOOS** total scores and **VAS** scale
 - **No side effects** for intrarticular injection of **LWPs**



RESULTS in SINOVIAL FLUID



- **IL-8** was correlated with worst post-operative articular function (**HOOS total**)
- Monocyte Chemoattractant Protein-1 (**MCP-1**) with worst post-operative Quality of life (**HOOS qol**);
- High level of cartilage degradation marker (**CTXII**) was associated with worst post-operative articular symptoms (**HOOS sym**).



TAKE HOME MESSAGES

- The use of **hydrolyzed collagen** treatments was **safe**, well-tolerated, and did not induce side effects
- The **outcomes** were **comparable** to cortisone and local anaesthetic for hip intrarticular injections post arthroscopic surgery
- **Hydrolyzed collagen** is a valid **alternative** for post-operative pain relief and hip function
- Worse post-operative outcomes in **older** and **obese** patients and in case of acetabular microfracture.

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THANK YOU

