1ST MTPJ PAIN
INDICATIONS AND APPLICATIONS OF INJECTABLES

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CASE Hx

Mr DY is a thirty year old semi-professional footballer.

(soccer to you)

Pain 1st mtpj's

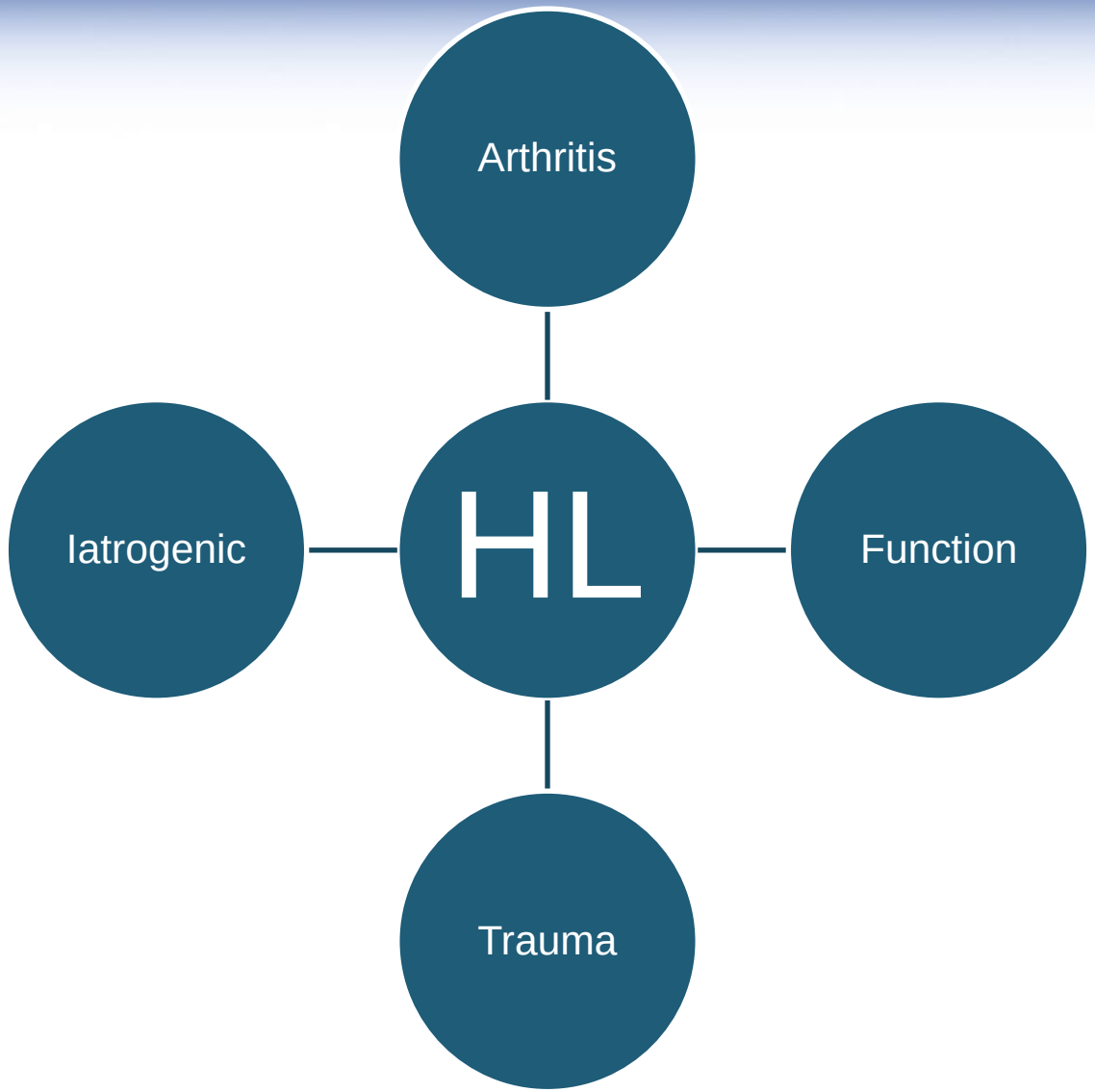
Ache

- **Activity : < Rest**
- **Gradual onset**

Aetiology of hallux Limitus/Rigidus

- **Suggested causes:**
  - Shoe wear (Davis-Colley, 1887).
  - Excessive pronation (Cotterill, 1888).
  - Age (Nilsonne, 1930).
  - Long first metatarsal (Nilsonne, 1930).
  - Hallux valgus deformity (Nilsonne, 1930).
  - Elevated first ray/ metatarsus primus elevatus (MPE) Lambrinudi, 1938)
  - First ray hyper-mobility (Jack, 1940)
  - Tight intrinsic muscles (Bingold & Collins, 1950)
  - Pes planus (Bingold & Collins, 1950)
  - Family history (Bonney & McNab, 1952)
  - Uncompensated varus deformities (Kessel & Bonney, 1958)
  - Flat, square or chevron shaped metatarsal head (DuVries, 1959)
  - Structural immobilization of the first ray (Root *et al,* 1977)
  - Osteochondritis dissecans (McMaster, 1978)
  - Trauma (McMaster, 1978)
  - Distal pseudopiphysis at the first metatarsal head (Vilaseca & Ribers, 1980)
  - Gender (Gould, 1981)
  - Short first metatarsal head (Wilson, 1988)
  - Secondary to rheumatoid arthritis, psoriatic
  - arthritis or gout (Karasick & Wapner, 1991)
  - Ankolyosis of sesamoids to first metatarsal head (Karasick *et al,* 1991)
  - Subchondral bone cysts (Hanft, 1993)
  - Tight medial slip of the planter fascia (Boyd *et al*, 1993)
  - Iatrogenic (Chang & Camasta, 2001)
  - Osteochondral fractures (Chang & Camasta, 2001)
  - Accessory navicular (Lee Evans, 2002)
  - Metatarsus adductus (Coughlin & Shurnas, 2003)

Aetiology of hallux Limitus/Rigidus



Pathophysiology

- **Pathophysiology HL similar to o.a. (Shereff et al 1998)**
- **Articular changes associated with dehydration of the cartilage, making it more susceptible to damage.**
- **Fibrillation of cartilage.**
- **Increased stress to subchondral bone.**
- **Subchondral sclerosis, loss of joint space and remodelling of 1st MTP Joint (eburnation).**
- **Periarticular osteophytosis, bone cysts.**
- **Weakening periarticular area, micro fracture (Joint Mice/Loose bodies).**
- **Ankylosis (Coughlin & Shurnas, 2003).**

Staging systems of hallux Limitus/Rigidus

GRADE	DORSIFLEXION	RADIOGRAPHIC	CLINICAL
0	40° to 60° &/or 10% to 20% loss compared with normal side	Normal	No pain only stiffness and loss of motion on examination
1	30° to 40° &/or 20% to 50% loss compared with normal side	Dorsal osteophyte is main finding, minimal joint space narrowing, minimal periarticular sclerosis, minimal flattening of metatarsal head	Mild or occasional pain and stiffness, pain at extremes of dorsiflexion and/or plantar flexion on examination
2	10° to 30° &/or 50% to 75% loss compared with normal side	Dorsal, lateral and possibly medial osteophytes giving flattened appearance to metatarsal head, no more than ¼ of dorsal joint space involved on lat. Radiograph, mild to moderate joint space narrowing and sclerosis, sesamoids not usually involved	Moderate to severe pain and stiffness that may be constant, pain ossurs just before maximum dorsi flexion and maximum plantar flexion on examination
3	Less than 10° &/or 100% loss compared with normal side. There is notable loss of MTPJ plantarflexion as well	Same as grade 2 but with substantial narrowing, possibly periarticular cystic changes, more than ¼ dorsal joint space involved on lateral radiograph, sesamoids enlarged and/or cystic and/or irregular	Nearly constant pain and substantial stiffness at extremes of range of motion but not at mid range
4	Same as Grade 3	Same as Grade 3	Same as Grade 3 BUT there is definite pain at mid-range of passive motion

Coughlin & Shurnas (2003).

OPTIONS

- Analgesics
- NSAID's
- Orthoses
- Cortisone
- HA
- Surgery

Rx

TREATMENT

NSAID’s

EVIDENCE

- No RCT’s
- Little published data
- Widely used

(1996): "Each year, use of NSAIDs (Non-Steroidal Anti-Inflammatory Drugs) accounts for an estimated 7,600 deaths and 76,000 hospitalizations in the United States." (NSAIDs include aspirin, ibuprofen, naproxen, diclofenac, ketoprofen, and tiaprofenic acid.)

BACKGROUND

1934

Palmer and Meyer isolated a novel polysaccharide from vitreous of bovine eyes.

1980’s

Hyaluronan was first marketed for human use in the early 1980s. Using HA derived from animal sources (rooster comb), Healon was introduced as a viscous, injectable gel for use during ophthalmic surgery.

.....

Subsequently HA has been used in many other indications, especially joint disorders.

Hyaluronan (HA) exists naturally in all living organisms (except plants) and is a universal component of the extra cellular space.

HA can be found in a number of body tissues including skin, the ocular vitreous body, articular cartilage, synovial fluid nd filter).

Osteoarthritis and Proteoglycans

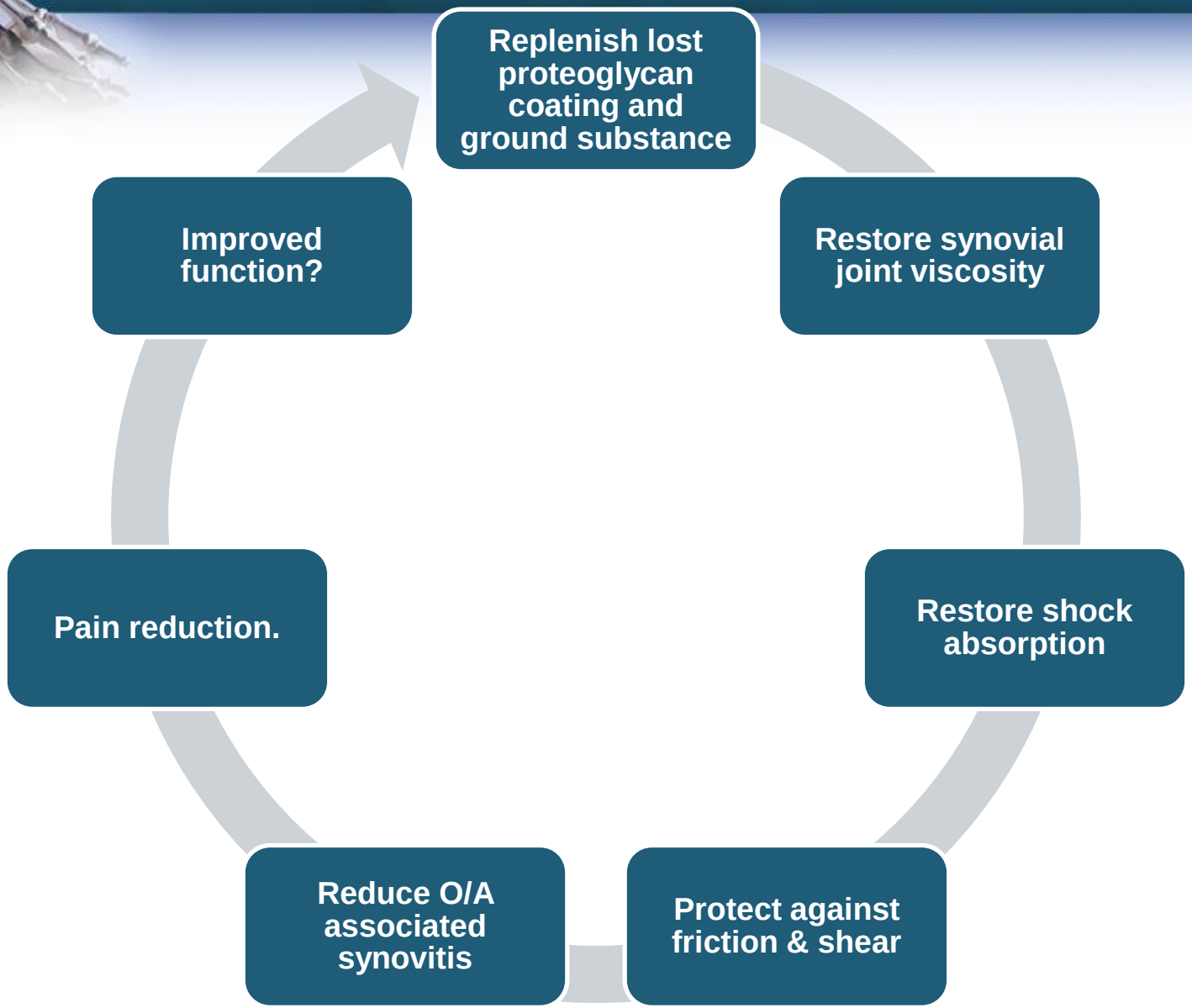
Onset of o.a.

- Constant replenishment of proteoglycans fails
- Cartilage exposed to abnormal forces
- > fibrillation and fissuring of the cartilage plate
- Remaining chondrocytes attempt repair creating fibro cartilage rather than further hyaline cartilage.

> further deterioration:

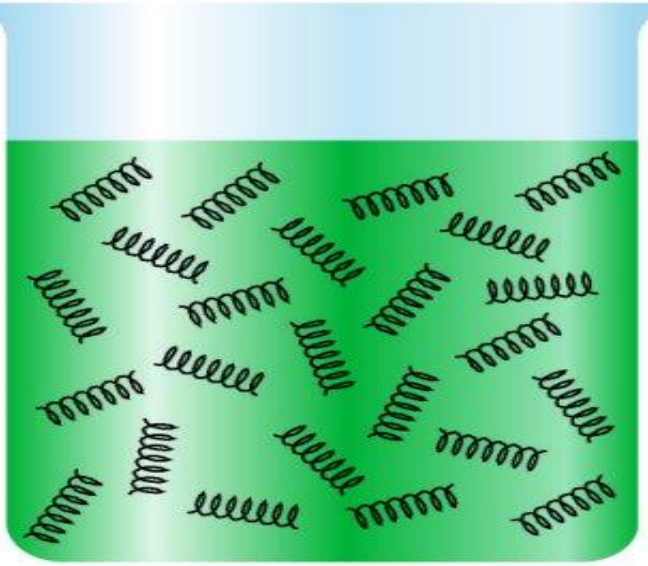
- Eburnation
- Subchondral plate remodelling
- Synovial inflammation
- Joint space narrowing
- Osteophyte formation

Rationale for H.A.therapy:

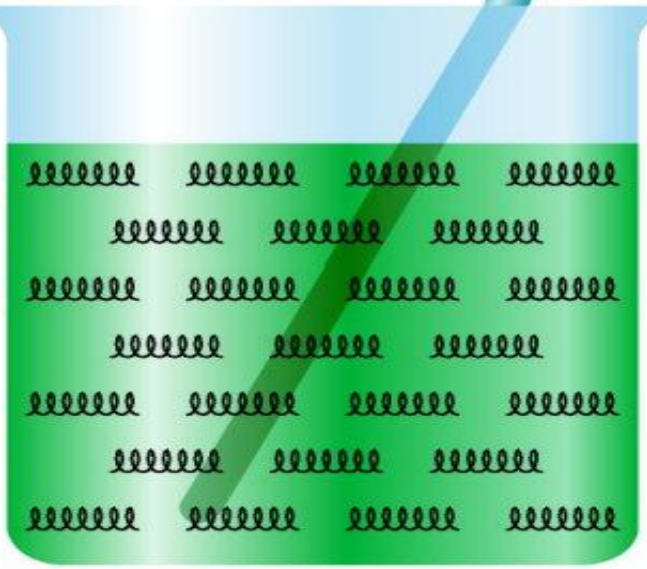


VISCOUS COMPONENT

Under sheer stress(surface against surface), the HA molecules in the synovial fluid act as a lubricant, protecting congruent articular surfaces from mechanical damage



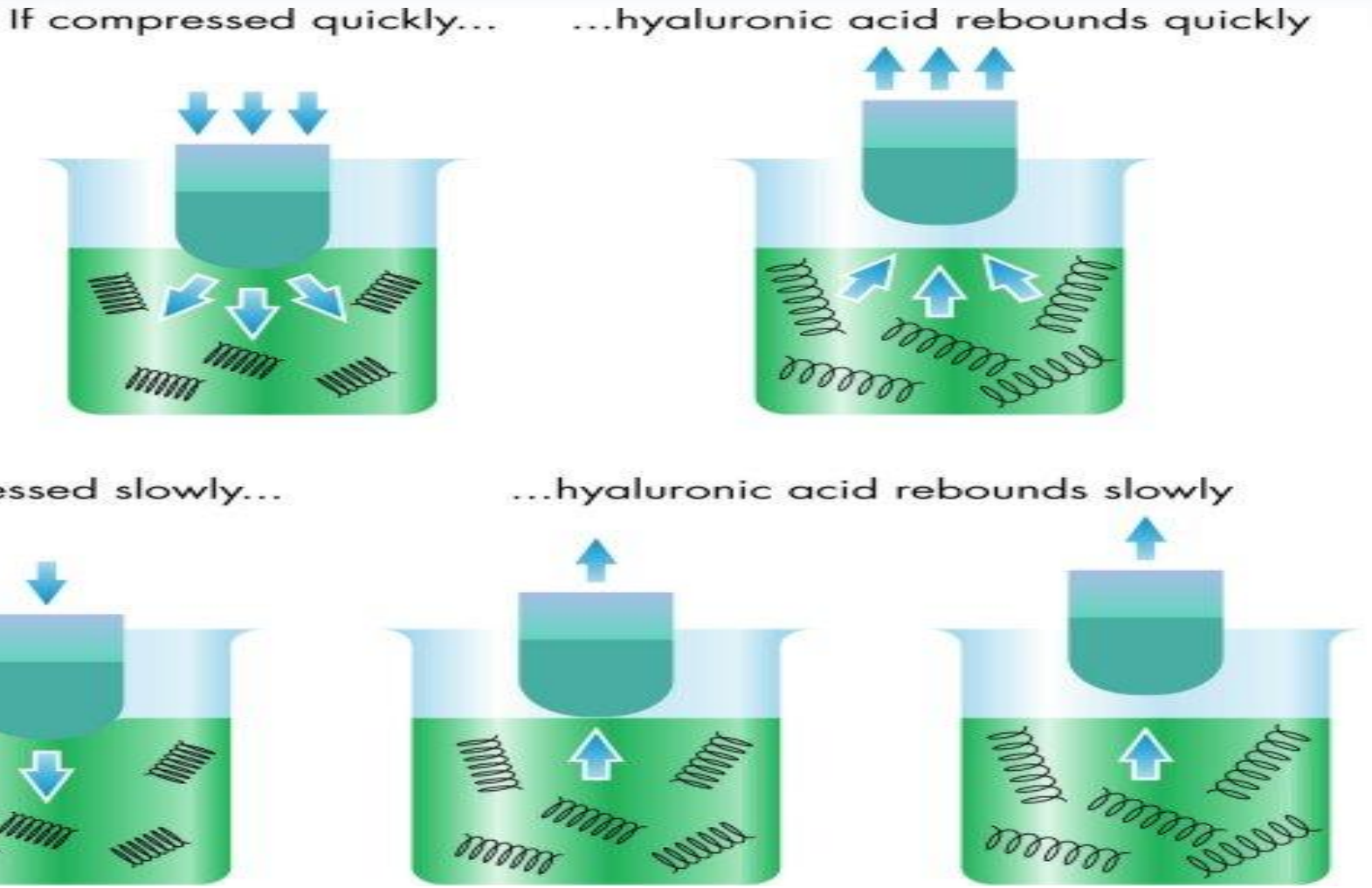
HA gel 'at rest'
(HA chains arranged at random to one another)



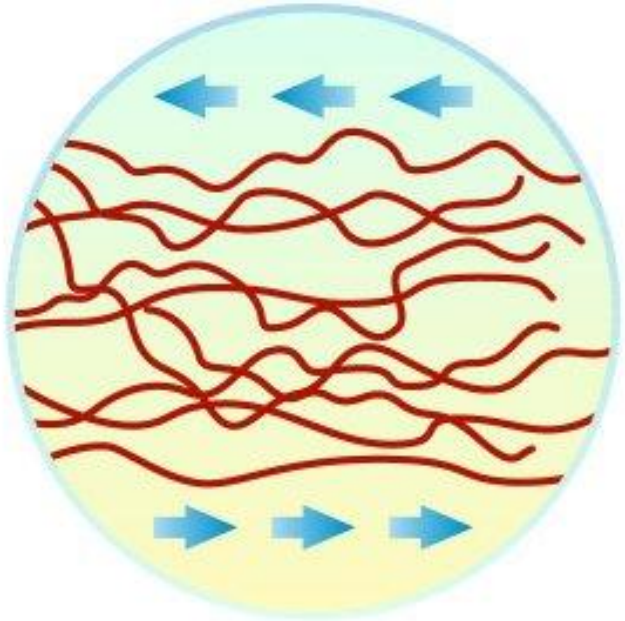
HA gel 'stirred'
(HA chains align in parallel, allowing them to move freely past one another)

ELASTIC COMPONENT

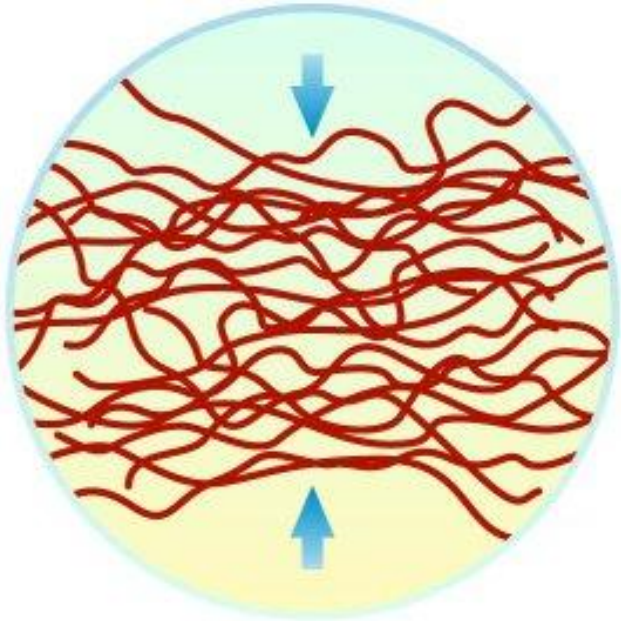
Under load bearing stress the HA in synovial fluid acts as a shock absorber, protecting the cartilage from compressive trauma.



Hyaluronan in the synovial fluid



Under gradual shear stress, hyaluronan acts as a lubricant

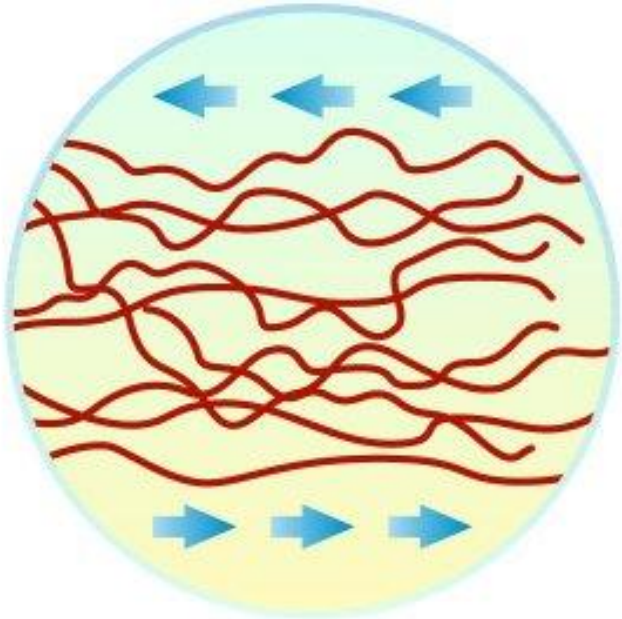


Under sudden loading, hyaluronan acts as a shock absorber

Lubricant

Shock Absorber

Hyaluronan in the synovial fluid



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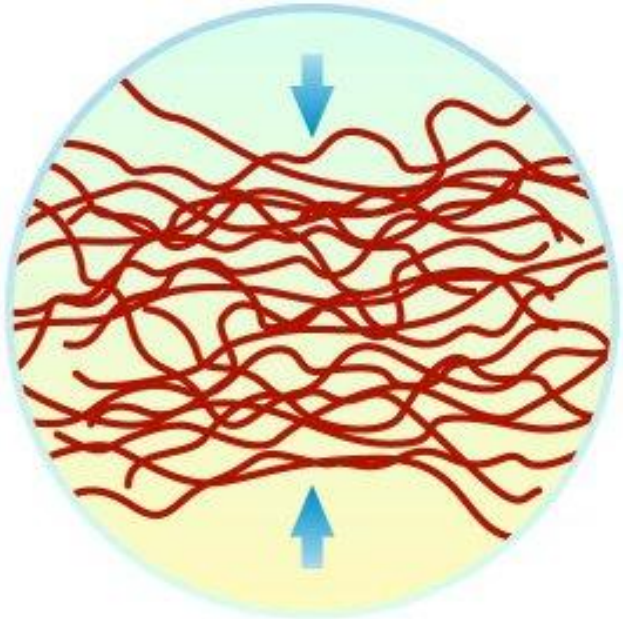

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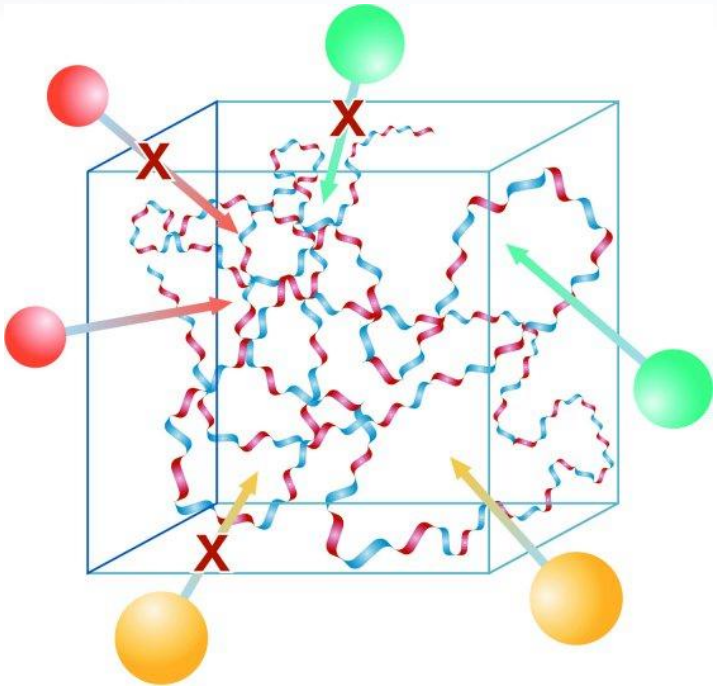
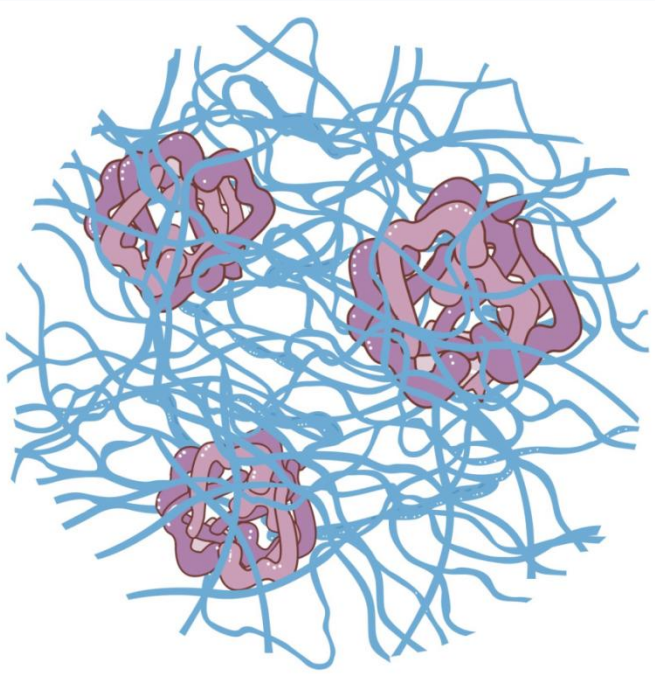
Lubricant

Shock Absorber

Hyaluronan in the synovial fluid

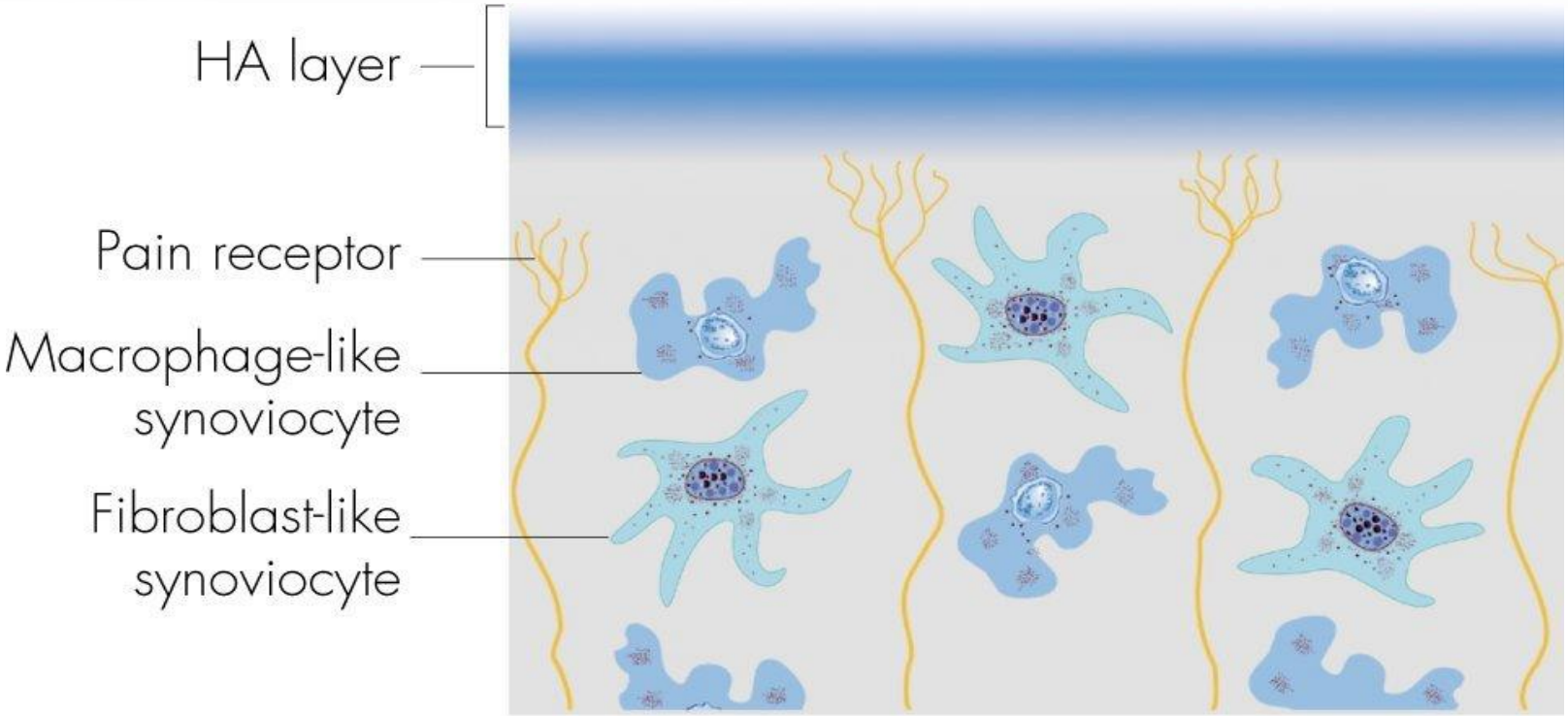


Small molecules such as water, electrolytes, and nutrients can diffuse to cartilage and synovium freely



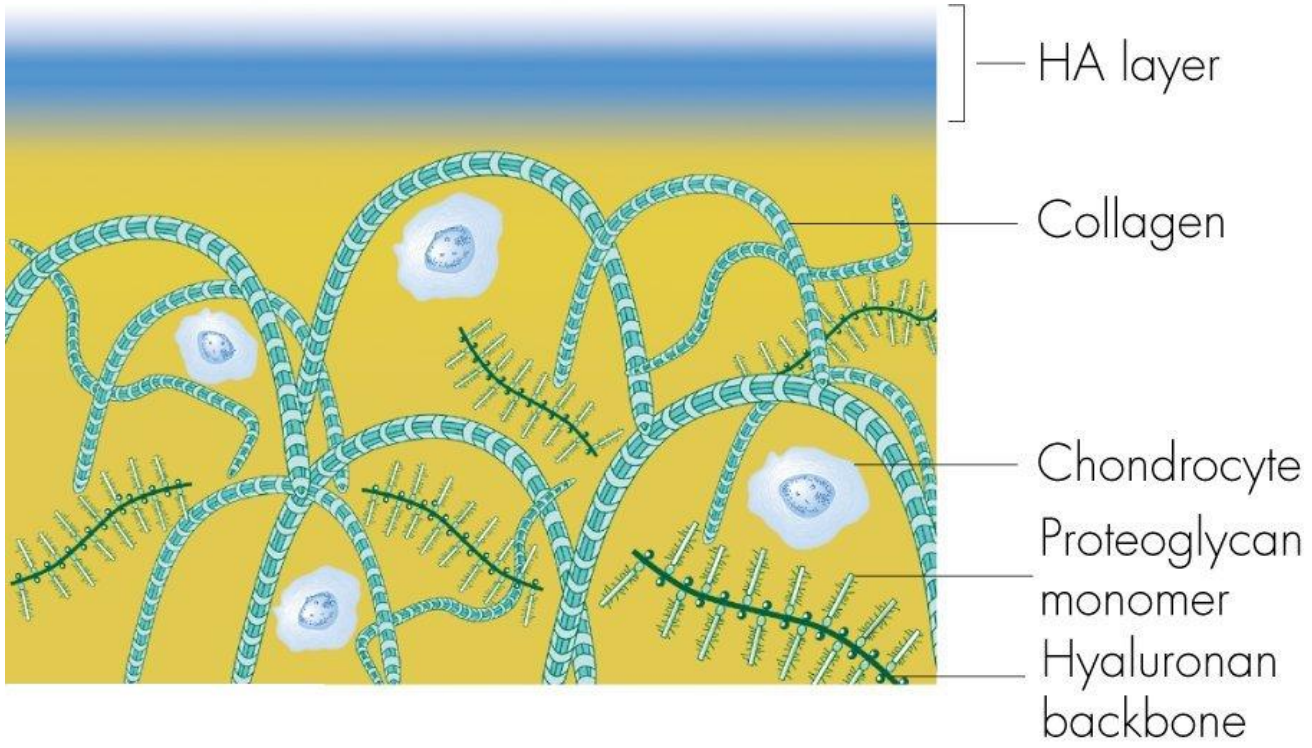
Larger molecules such as proteins and other inflammatory mediators encounter a higher degree of retardation in passing through the network

Protective coating of the synovium



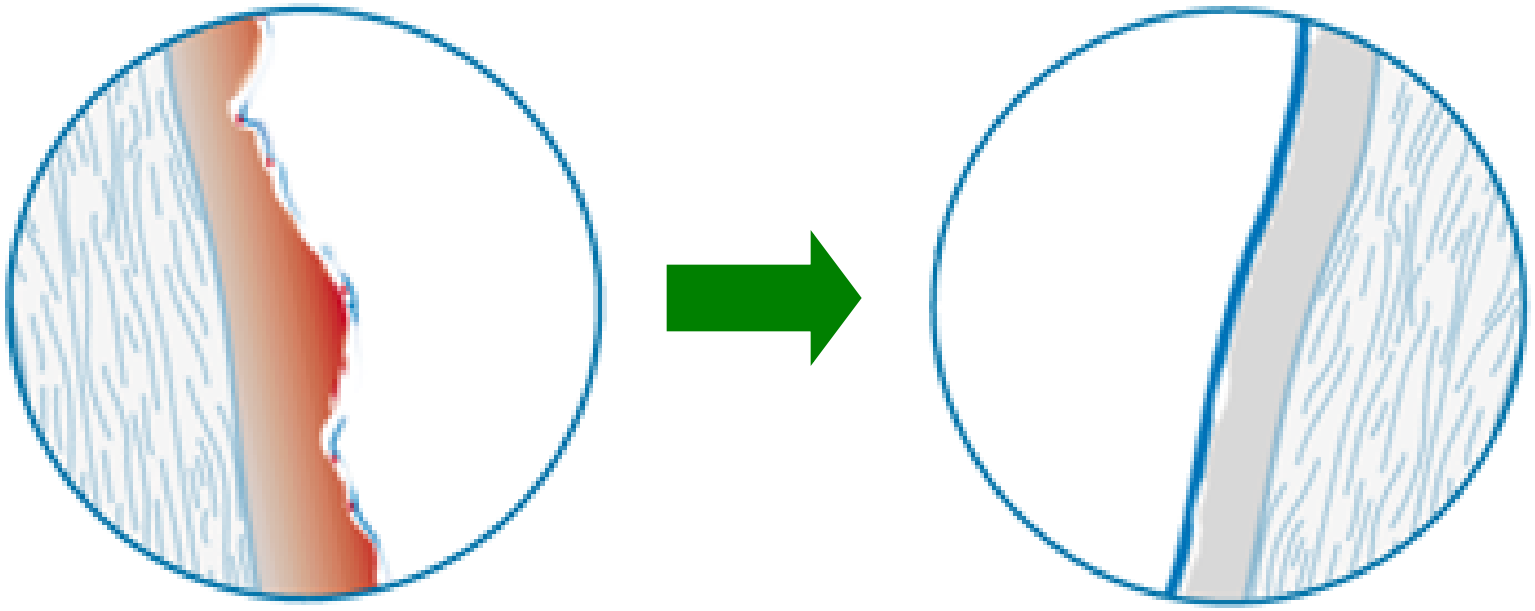
- Masking pain receptors
- Barrier function

Hyaluronan in the cartilage

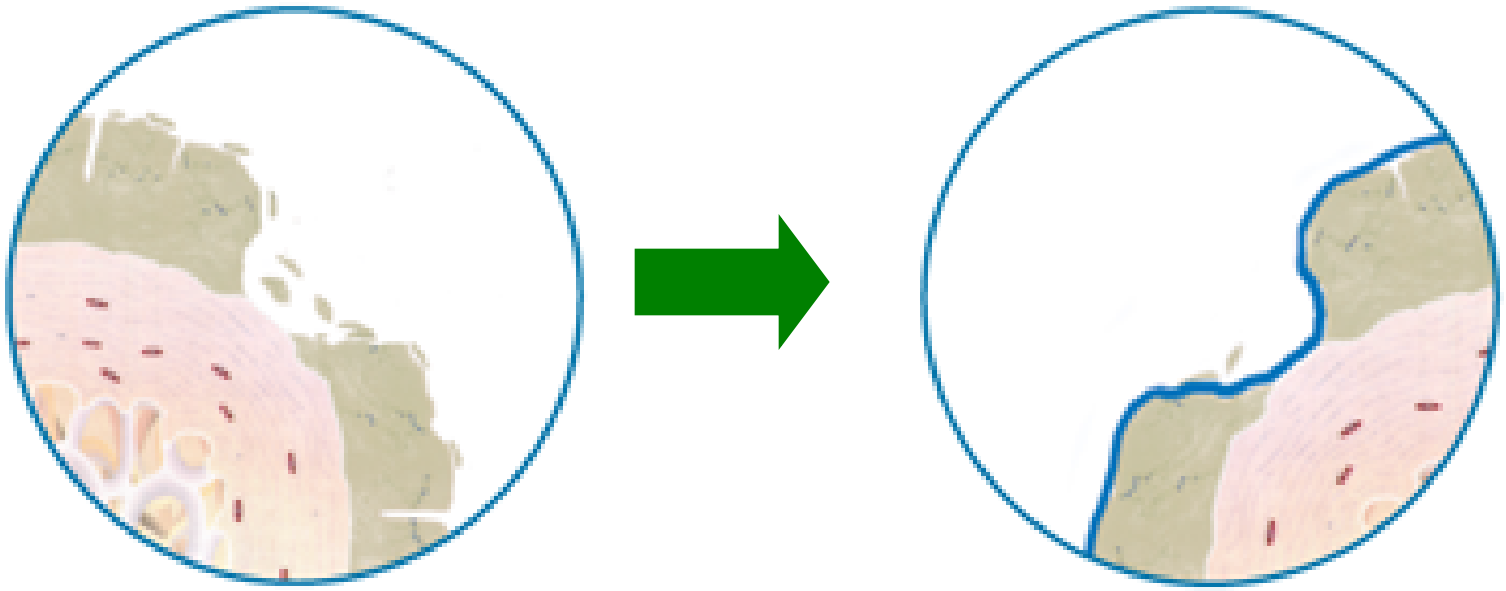


- Backbone of proteoglycan aggregates
- Barrier function

Effects on the synovium



Restoring the protective coating



WHEN IS H.A. THERAPY APPROPRIATE?

H.A. therapy

0	• No osteophytes
1	• Doubtful osteophytes
2	• Minimal osteophytes with minor joint narrowing and cysts
3	• Moderate osteophytes with joint space narrowing
4	• Severe osteophytes with substantial joint space narrowing

APPLICATIONS

Therapeutic Goal

- reduce painful
- improve joint mobility(1-3).

In Osteoarthritis (OA), a significant decrease in the synovial fluid HA concentration and molecular size has been documented([4,5]).

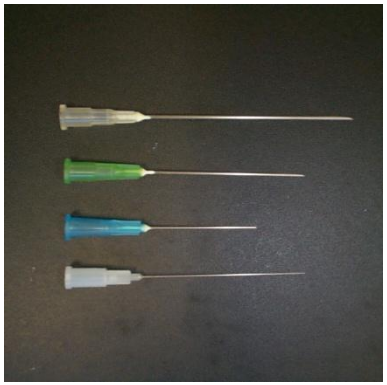
Because a quantitative and qualitative decrease in the synovial fluid HA is believed to accelerate cartilage destruction in OA, intra-articular HA injection therapy has been widely used in the treatment of OA.

Many clinical investigations of HA have reported significant symptomatic improvement in OA patients([6–12]).

Moreover, it has been reported that repeat treatment cycles of intra-articular hyaluronan result in a statistically significant delay in radiological joint space narrowing within one year in patients with osteoarthritis of the knee([13]).

TECHNIQUE

EQUIPMENT

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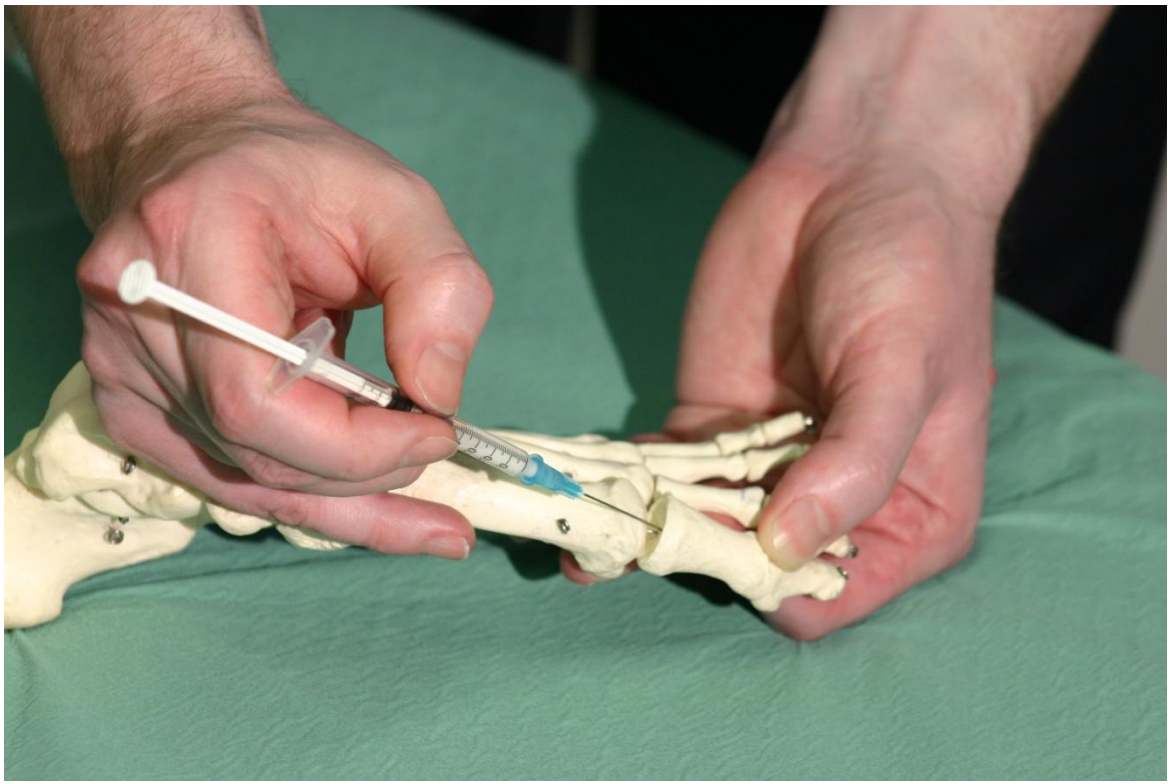
ostenil

Technique



EVIDENCE

Ostenil and the 1st MTP Joint.

Alvarez et al, 2004.

- **RCT : 37 patients compared Ostenil V Triamcinolone**
- **Reduction in pain and increased AOFAS scores with Ostenil treatment.**
- **No functional improvement was noted.**
- **Less pain compared with the steroid group at 14 wks**

Ostenil and the 1st MTP Joint.

Talke, 2004

- **21 patients who received a course of 5 Ostenil injections. FUt 12 weeks post treatment:**
  - 2 symptom free.
  - 9 clear improvement.
  - 7 significant improvement.
  - 3 improvement.
- **Max < in VAS scores achieved at 3rd injection**
- **No adverse events**

Technique

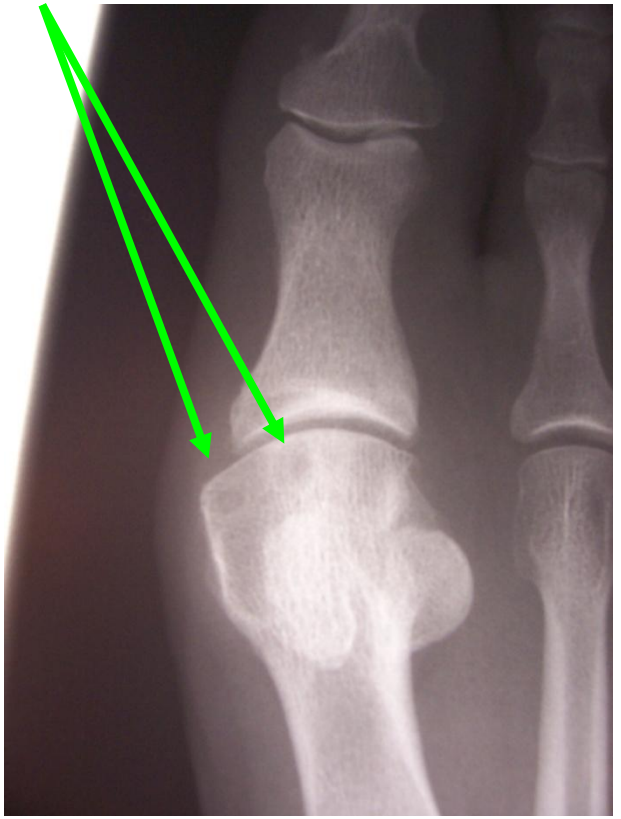
Example Case.

- 45 year old female C/O pain & swelling of 1st MTP joint.
- “joint locks and jams when walking”.
- O/E limitation of motion and dorsal swelling with possible osteophyte formation.
- Conservative and surgical treatment options discussed and plain films arranged.

Plain Films

- Slight dorsal prominence
- And soft tissue swelling

- Early cystic changes



Treatment

- Advised OTC analgesics & NSAIDs.

- Consent for treatment with Ostenil.
  - **1st injection offered 3weeks pain relief.**
  - **2nd injection has so far offered 4 months pain relief.**
  - **No obvious functional improvement.**
  - **Reduction in soft tissue swelling.**

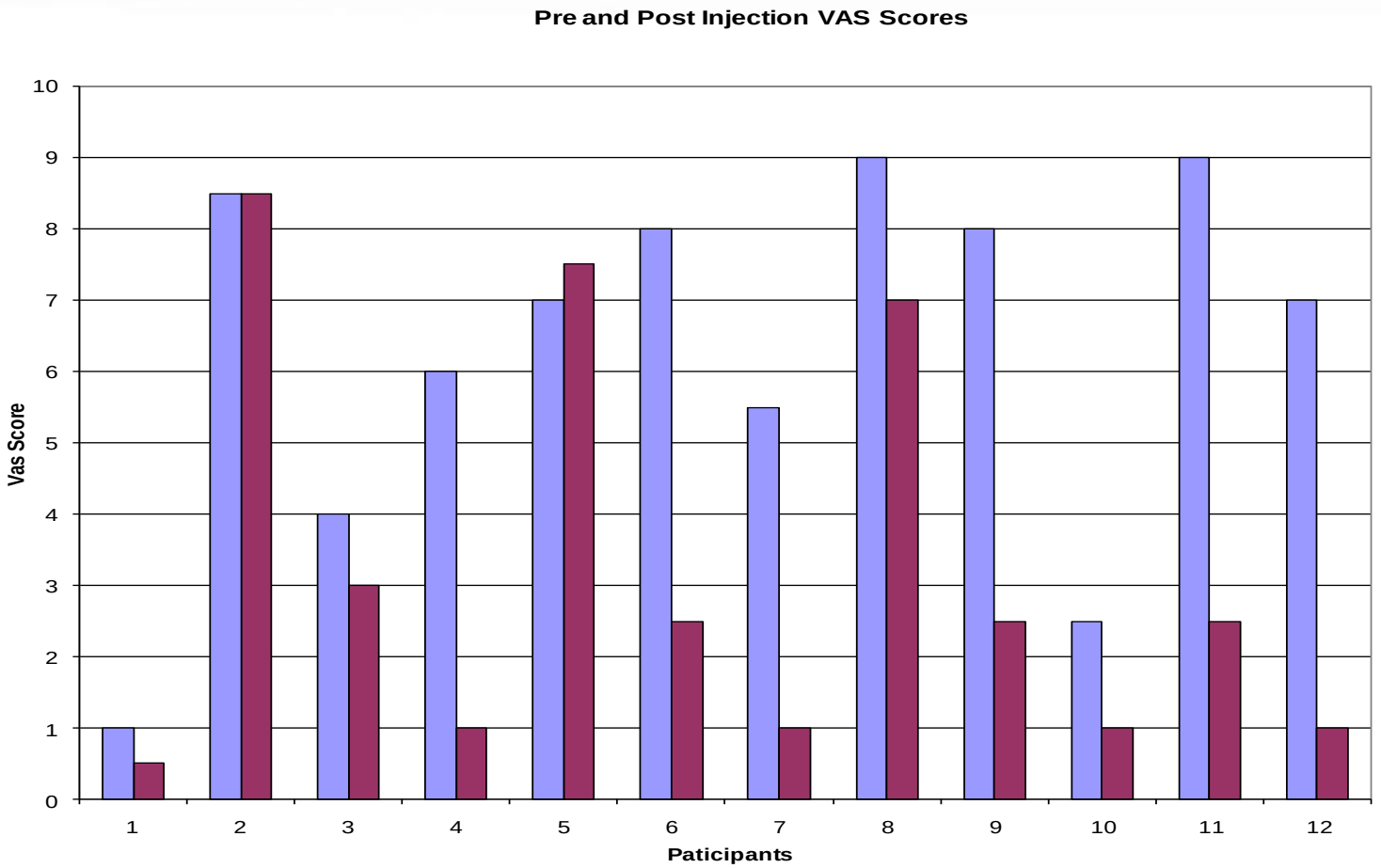
Results

- The data from 12 of the 15 patients was usable.
- The average pre injection VAS score was 6.3 (range 1-9).
- The Average post injection VAS score was 3.2 (range 0.5-8.5)
- 50% reduction on pre injection scores.
- Statistically significant reduction in pain *p=0.002 / t= 2.200985159*

Pre & Post injection VAS score Data

Participant	Pre Injection VAS Score	Post Injection VAS Score
1	1	0.5
2	8.5	8.5
3	4	3
4	6	1
5	7	7.5
6	8	2.5
7	5.5	1
8	9	7
9	8	2.5
10	2.5	1
11	9	2.5
12	7	1
Average	6.3	3.2

Pre and Post injection VAS Scores



Results

- The duration of benefit was variable.
  - **Two patients (17%) reporting no benefit.**
  - **Three (25%) had up to a months pain relief.**
  - **Three had up to six months pain relief.**
  - **Four (33%) patients had at least six months pain relief.**

Drug Safety

A large randomised double blind study of 209 patients with knee osteoarthritis found hyaluronic acid to be a safe treatment with only minor local reactions of short duration (Puhl et al, 1993).

One case of a possible aseptic arthritis following a knee injection, marked inflammation and purulent joint fluid led to an initial diagnosis of infection.

SUMMARY


FREE
MAMMOGRAM
PLACE BOOBS HERE

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