

# The Osteoarthritis Cycle

Often terms like 'joint wear' and 'cartilage thinning' describe what happens mechanically in osteoarthritis (OA). It is also crucial to understand the painful biology associated with the changes happening inside the joint. Why is wear and tear happening and can we do anything to help it?

OA works like an ongoing cycle. As the joint's biology changes, mechanical stress increase, the severity of arthritis likely increases as the symptoms play off on each other.

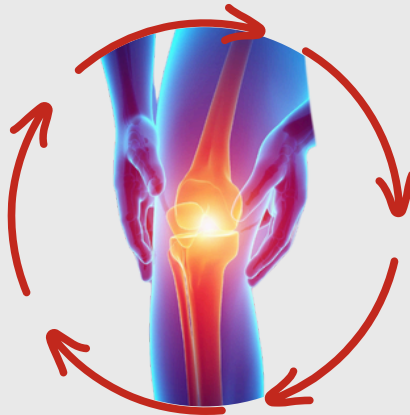
Although exercise is good for arthritis, physical stress starts to affect a joint with arthritis during movement, leading to discomfort.

Swelling and inflammation creates more pain. Compromised joint fluid prevents normal repair of cartilage

Smooth joint surfaces (cartilage) which normally protects the joint, start to break down.

Natural hyaluronic acid is broken down with reducing production from the cells. It is a key component of healthy joint fluid

The breakdown of the joint surface releases damaging proteins which also causes pain.



This then effects the fluid in the joint which in a healthy joint cushions and protects it.

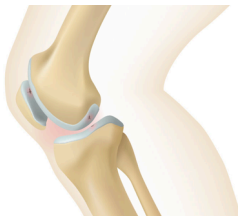
## Here's what happens mechanically as osteoarthritis progresses

**Stage 1**  
Doubtful



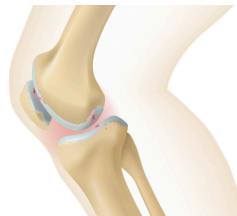
Minimal disruption but there is already 10% cartilage loss, starting the OA process

**Stage 2**  
Mild



Joint space narrowing, cartilage begins to break down, osteophytes can form accelerating wear

**Stage 3**  
Moderate



Moderate joint-space reduction. Gaps in cartilage can expand until they reach bone

**Stage 4**  
Severe



Joint-space greatly reduced, 60% of the cartilage is lost. Large osteophytes formed

# A healthy joint produces the perfect Hyaluronic Acid (HA)

Hyaluronic acid (HA), naturally produced in your healthy joints, plays a crucial role in nourishing the synovial fluid. This fluid not only lubricates the joint but also supports healthy cartilage, creating a healthier environment within the joint.

As we know from the OA cycle diagram overleaf, natural hyaluronic acid has been broken down and no longer optimally produced by the joints cells. Injection therapies that are balanced and optimised correctly can support the cells in the joint to start producing their own HA once again. This allows a therapeutic effect from the injection to last longer, beyond the time it stays in the joint.

Only the right molecular weight can stimulate the cells in the joint to produce their own HA again, by binding to synoviocytes cells

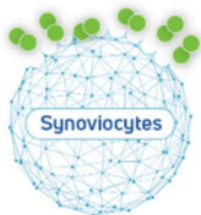
Reference 4 in booklet

<500,000da

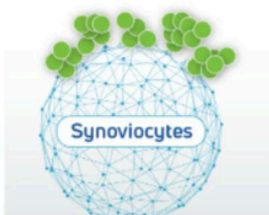
Molecular Weight of HA in daltons (da)

500,000 - 4,000,000da

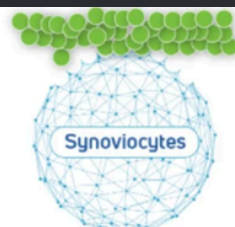
>4,000,000da



Limited biological support



Optimal biological support



Limited biological support

Ostenil Plus - 40mg HA

Cingal & Monovisc 88mg HA

Durolane 60mg HA

As you can see, the molecular weight of the HA has to be in the 'Goldilocks Zone' for its molecular weight to maximise stimulation of the joints own HA. Concentration of HA injections can vary greatly as well. This is measured in milligrams (mg). The above options are all single injection products.

The diagram is adapted from a very well respected scientific study, reference 4 in the booklet, that considers the perfect molecular weight that hyaluronic acid injections need to be to best stimulate the joints on HA production.

Monovisc and Cingal are optimised in molecular weight aligned to this study, maximised in concentration, and lightly cross-linked so they stay in the joint longer, producing the best clinical results for response rates and pain reduction.