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## Osteoarthritis (OA)

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Key words: Arthritis, articular cartilage, chondral injury, physiotherapy, glucosamine, joint replacement, anti-inflammatory medication, arthroscopy, joint replacement.

Osteoarthritis is the most common form of arthritis in the world. It affects huge numbers of people and is often accepted as an inevitable part of ageing. As industrialized populations become older and live longer, the effects of osteoarthritis (OA) will become more marked.

A slowly progressive joint disease, it can lead to local joint destruction and disability.

It is recognised as a group of conditions which present with similar features in the person and on Xrays, whatever the underlying cause may be, which may not be clear. The end result is "joint failure".

### Definition

(Osteo - bone, arthritis - joint inflammation)

There is no simple definition of OA. One definition was proposed by a workshop held in 1995 and is interpreted by the author as:

"Osteoarthritic diseases are the result of both mechanical (physical stresses) and biological events which interfere with the balance of building up and breaking down in the joint cartilage and the underlying bone. OA involves all the tissues of our joints although it may be caused by many factors. OA exhibits multiple changes which result in softening, cracking and ulceration of joint cartilage, hardening of the bone beneath the cartilage and bony outgrowths.

These changes may go unnoticed by the person but when they become evident the symptoms consist of joint pain, tenderness, limitation of movement, cracking and crunching, perhaps swelling and inflammation. Unlike arthritic diseases such as rheumatoid arthritis there are no systemic effects - ie effects on the whole person such as feeling unwell or loss of weight."

[The American College of Rheumatology](http://www.Orthopaedics.co.uk) has classified OA into primary (OA appears without obvious cause) and secondary (OA caused by something known).

### Primary

- **Localized** - ie of either hands, feet, knees, hips - one site affected
- **Generalized** - three or more of the above joint groups affected

### Secondary

- **Post-traumatic** - after an accident or injury, especially if it affected the joint directly
- **Congenital/developmental diseases** which cause joint abnormality
- **Localized problems** - joint abnormality such as congenital dislocation of the hip
- **Generalized problems** - various metabolic diseases
- Other bone and joint disorders - rheumatoid arthritis (RA), Paget's disease, avascular necrosis (where part of the joint dies from cutoff of the blood supply).

### Other diseases

- **Endocrine (hormonal) diseases**
- Joint disease due to **nerve problems**.

### Features of osteoarthritis on examination

Features of OA are divided into symptoms - what the person is complaining of, and signs - what the examiner can find.



### Symptoms

- Joint pain
- Stiffness in the morning
- Instability or giving way of the joint
- Loss of normal function of the joint and the person as a whole

### Signs

- Pain on movement
- Swelling of the joint
- Bony enlargement of the joint
- Limitation of range of movement
- Joint crunching when moved
- Tenderness to pressure
- Joint deformity or poor alignment - eg bow leg or knock knee

### Pain

Pain is the most common complaint and the thing which brings people to a doctor. Its intensity and nature is described in hugely variable ways by different patients but it usually comes on gradually, is mild or moderate in level, is made worse by activity and improved by rest.

Activity pain usually begins soon after the activity itself and may continue for hours after the activity ceases. Many people complain of a vague ache or pain during activity while others describe sharp or stabbing pains associated with a particular activity.

If OA is severe there may be pain at rest (50% of sufferers or less) and at night (around 30% of sufferers). Severe and progressive OA occurs at times, with a severely painful joint and significant disability.

Pain in joints with OA could come from the membrane lining the joint, the joint capsule (fibrous bag around the joint), the ligaments around the joint, from muscle spasm and the underlying bone. Osteoarthritic joints are often tender at points around the margins and very sore if knocked or injured in any way.

However, pain in OA is not simply related to the changes in the joint or surrounding tissues but is influenced by many factors. Although pain complaints fit well with x-ray changes of OA, the severity of pain does not reflect the severity of the changes. This means someone may have significant OA changes on x-ray but complain of little pain, while someone else may have little evidence of joint changes on x-ray but complains of severe pain.

### **Stiffness**

Most people with an arthritic joint complain of stiffness at some times, either in the morning or on movement. Stiffness is hard to define clearly but we all know it when we get it. It seems to be either difficulty in getting a joint moving again after it has been still for a while, or a feeling of resistance as the joint is moved through its range.

A joint may have to be loosened up in the morning for a few minutes to half an hour. Longer periods of stiffness, or widespread stiffness through the body, is more characteristic of the arthritic diseases, the most common of which is rheumatoid arthritis.

### **Loss of joint movement**

Joints often lose some of their range of movement when affected by OA, with the ends of the movement reduced. Pain is often present when the joint reaches the end of its limited range. The reasons for this may be various: a thickening and tightening of the fibrous bag surrounding the joint, remodelling of the joint as the cartilage thins and the underlying bone becomes denser and bony outgrowths at the margins of the joint (osteophytes).

### **Instability**

Giving way of a leg is a common complaint with OA of the knee or hip, with a feeling of insecurity, as if the leg cannot be trusted at times to support the weight of the body. There may be no actual signs of the joint being unstable but often there is weakness with muscle wasting. It may be that the muscles are weak or poorly coordinated as so the leg feels less trustworthy at times.

### **Bony enlargement**

OA joints may have enlarged areas around them, which seem to be bony in nature in that they feel very firm and also tender. They may be made up of a mixture of soft tissue, cartilage and bony outgrowths.

### **Swelling and inflammation**

Apart from firm swellings, there may be soft swelling (e.g. "water on the knee") in OA joints, which is quite different to the harder swelling described above. In this case the cause of the swelling is not well understood, but it is composed to synovial fluid, an overproduction of the natural lubricating joint fluid. OA joints may feel warm at these times, and this may be due to a low grade inflammation occurring, with periods where the inflammation is more obvious with joint warmth and redness. These increased inflammatory symptoms may occur during flare ups of the joint pain and problems, typically lasting for a few weeks.

### **Joint destruction**

When OA gets severe it may be obvious that there is severe damage and destruction to the joints involved. As wear progresses in some joints, they may alter shape and become deformed. Examples are bow-leg and knock-knee in the knee joint, shortening of the leg in hip disease and the deformity and instability (wobbliness) which can occur in the end joints of the fingers.

### **Functional loss and handicap**

OA causes a great burden to millions of people trying to live their lives in the world. Functional loss can be caused by pain, loss of movement or a decrease in muscle power. This can lead to disability, for example difficulty reaching the feet to dry them or put on socks, limited walking distances and problems with stairs. This in turn can lead to handicap, which is related more to the loss of independence, loss of role and depression which many people suffer.

### **Creaking and crunching**

In OA, patients often complain of crunching and cracking in their joints (technically called crepitus). A joint may give out loud cracks and crunches if the arthritis is severe. These noises may be due to the roughening and abnormality of the joint surfaces.

### **X-rays**

Diagnosing OA is often confirmed by the changes seen on x-ray - bony outgrowths at the joint margins, narrowing of the 'joint space' where the cartilage has worn down, increased density of the bone underlying the cartilage, cyst formation in the underlying bone and sometimes obvious deformity of the joint. Blood tests are usually normal.

### **Outlook**

Over time, the usual pattern of OA is for the x-ray changes to progress gradually, but in some people the picture may not change over long periods. Pain may improve, but function of the joint less commonly does.

### **Natural history of OA**

It is difficult to give any exact opinion on how things will go with any particular joint or person, as the course of OA varies greatly.

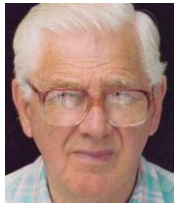
OA usually takes years to develop to the level where it begins to interfere with the person's life.

Typically, the symptoms bumble on with worse and better periods, with flare ups at times when the joint can be much worse for days or weeks.

Others may notice very little change in the status of their joint over a long period, even years. Interestingly, there is evidence that finger and hips joints can show not only symptomatic improvement but also improvement on xray.

In the most commonly affected joints, the fingers tend to progress the most quickly, the knees the most slowly, with hips inbetween. Change in joint pain and bony destruction can be rapid in some cases, leading to a severe worsening in the person's functional status.

### **Britain's ageing population**



The age structure of the British population is undergoing unprecedented change.

The changes in social policy and healthcare which started in Victorian times have contributed to the great success of increasingly long lives for a large proportion of people.

The present and continuing changes have and will have increasingly strong effects on many aspects of society, including the provision of health care.

The Office for National Statistics figures show that the number of people aged 65 years and over increased from 7.4 million (13% of the population) in 1971 to 9.2 million (16%) in 1996 and is estimated to increase to 14.5 million (24%) in 2061.

People aged 65-74 could expect to live for 14.2 years if they were a man and 17.9 if a woman. Half of these remaining years are expected to be lived with some kind of disability.

Projecting the number of people with chronic musculoskeletal problems from reported prevalences in 1989 gives an increase from about 2.75 million in 1996 to 4.4 million in 2036. Some of this group will have arthritic problems involving the hips.

It is likely the number of people aged 65 and over will rise substantially over the next few decades. The frequency of conditions such as osteoarthritis rises with age so the number of hip replacement operations is also likely to rise.

### **Causes and incidence of OA**

OA is the commonest cause of joint disability in developed world, and listed in the top 10 of the global disease burden according to the [World Health Organisation](#).

In white North Americans and North Europeans, about one-third of adults between 25 to 74 years have signs of OA on their x-rays in at least one joint. In the US, 6% of those over 30 and 12% over 65 have a troublesome OA knee.

Most common areas to be affected by OA are the hands, followed by feet, knees and hips. See [development of OA](#) for a more technical account of the condition.

### **Risk factors for OA**

#### **Genetic factors**

OA appears to be strongly genetically linked.

- Sex - more common in females
- Inherited disorders of type 2 collagen (a main component of joints, ligaments, skin). An example is Stickler's syndrome
- Genetic mutations of the type 2 collagen gene
- Other inherited joint or bone disorders
- Race and ethnic origin

#### **Non-genetic factors**

- Increasing age
- Being overweight
- Reduction in female sex hormones (eg after menopause) - this is not clear
- Developmental diseases of bones and joints, and any acquired during life.
- Knee trauma is a significant risk factor, such as anterior cruciate, [meniscal and ligamentous injuries](#).
- Previous joint surgery such as ["cartilage"\(properly called menisci\) removal](#) from knees
- Race and ethnic origin

#### **Environmental factors**

- Occupations and physical effort of work
- Excessive repetitive joint use
- Major accidents/injuries to joints
- Leisure and sports activities

Risk factors are complex and may vary both from joint to joint and even within certain areas of one joint.

#### **Age**

Age is the strongest risk factor for OA and the rates of arthritis for all joints rises with increasing age. Why age is important in OA is not clear. Aging joint cartilage may undergo chemical changes which render it vulnerable to the development of OA but there is no good evidence for this.

#### **Women**

Women are at higher risk of developing OA than men, especially after the menopause but the reasons for this are complex and not well understood.

#### **Weight**

Obesity is strongly associated with knee (and to a lesser extent hip) OA, perhaps due to the increase in stress put through the joint when the person is overweight. However, systemic factors may be involved because obesity is linked to hand OA too.

#### **Jobs**

Occupations and sport are also associated with developing OA. Jobs which involve kneeling, squatting and stair climbing are connected with higher rates of knee arthritis. Heavy repetitive joint use appears to increase OA risk.

Jobs involving repetitive heavy lifting (eg farming) show higher rates of hip arthritis.

### **Sport**

Sport participation is connected with lower limb arthritis. Jogging, however, does not seem to increase the risk of OA if the person's joints are normal.

### **Other risks**

Joint deformities, knee mal-alignment, joint laxity (loose ligaments), changes in walking pattern and quadriceps muscle weakness are all associated with OA knee.

## **Development of osteoarthritis**

### **The onset of symptoms**

Many joints with signs of OA on examination or on xrays show no symptoms as far as the person is concerned. Onset of symptoms is usually insidious (medic speak for slow and sneaky) and people can seldom indicate exactly when they felt the trouble started.

The typical onset of OA in a joint is variable but people often notice changes in a joint related to, or immediately after, some activity with that joint. This can be a vague and occasional ache or pain in the joint, sometimes with mild joint stiffness and aching in the muscles near the joint.

Range of motion of the joint may also be affected, either slowly by gradually becoming aware of a restriction in doing a normal activity or quickly by having a minor injury. A small injury can set off a process where all the symptoms of OA will develop over a few days, in some cases rather severely. OA changes were almost certainly present in the joint prior to the injury, which converts a previously trouble-free joint into a painful and stiff one.

Aches and pains in our joints and muscles is a normal part of human life, and people with OA may just notice an increase in the severity and frequency of these normal symptoms. This is usually taken as nothing to worry about and part of the ageing process until the severity of the symptoms drives the person to consult a doctor.

### **A disease of articular cartilage?**

OA is thought primarily to be a disease of the articular cartilage, the smooth lining of the joints. Changes also occur in the bone beneath the cartilage and it is not known where the first areas of abnormality are.

Articular cartilage has two main functions:

1. To absorb stress by compressing under mechanical load
2. To provide smooth, friction-free joint movement

The cartilage matrix (the chemical and biological constituents) is in a state of constant change in life, which in healthy people is a balance between the processes of building up and breaking down. OA is seen by some people as a failure to maintain this balance, due either to a reduction in formation or an increase in breakdown. Patients with well-defined OA often show changes in the bone underlying the cartilage on their x-rays. These changes are increasingly thought to be a cause of OA rather than a consequence. The cartilage relies on the mechanical health of the underlying bone to maintain its own normal function.

### **Underlying bone the culprit?**

In one model (view) of OA the idea is that a stiffening of the underlying bone results in bone which is no longer a good shock absorber for the cartilage. This may result from repetitive micro fractures in the bone.

There are various lines of evidence which support this view, as well as the inverse association between OA and diseases of low bone density such as osteoporosis. This means that when the bone density is low the occurrence of OA is much less common, indicating bone density is important.

In people with hip OA, bone density is higher on x-ray than the density of people with normal x-rays, and not just at the hip but also in other areas away from the hips.

### **Inflammation?**

The presence or absence of inflammation as an important factor appears unclear. There may be some inflammatory process some of the time. Inflammatory processes are usually concerned with healing but in OA seem to be harmful and lead to increased cartilage loss.

Risk factors are complex and may vary both from joint to joint and even within certain areas of one joint.

### **Management & treatment of osteoarthritis**

Treatment of OA concentrates on controlling the symptoms as there is no way to control the process, and pain is the measure used to check success or otherwise.

Treatment is progressed from less invasive and risky treatments up to surgery, depending on severity and areas of joint involvement.

### **This is a 10 point list:**

1. **Education** about the condition, treatment and the future is important. Self-help groups are organized by arthritis charities such as the [Arthritis Research Campaign](#) in the UK. Self-management programmes and cognitive-behavioural programmes are aimed at teaching attitude change and coping skills. There is some scientific evidence that education reduces pain and disability in hip or knee arthritis.
2. **Physiotherapy** is important in the management of OA. Strengthening of the quadriceps muscles has shown to be effective in reducing pain and improving function in knees. A study showed that aerobic and resisted exercise, combined with education and drugs, gave better results than education and drugs alone in people with knee OA and mild disability
3. **Weight reduction** reduces the risk of developing OA of the knees, and helps reduce pain and improve function in older women with knee OA. Routine diet management has a useful place here
4. **Drugs** are used to combat pain and paracetamol is the first choice, with non-steroidal anti-inflammatory drugs (NSAIDs) added if the pain does not respond. Medical advice is needed to choose the best drug or the one with the least side-effects. Scientific reviews have found paracetamol (acetaminophen) and anti-inflammatory drugs to be effective in controlling the pain of OA, although anti-inflammatories have not been shown to be more effective than paracetamol. **There can be severe side effects on the gastrointestinal system from non-steroidal anti-inflammatory drugs and the situation should be discussed with your medical adviser**
  1. **Application of creams to the joints** can be helpful, such as NSAIDs or capsiacin, especially if only one or two joints are affected. There is limited evidence for the effectiveness of this treatment, and no guide as to which agent is any better than any other.
  2. **Injection of corticosteroids into the joint** is a common treatment but there is little scientific evidence to back it up. Some people report long term improvement in their pain after injection but there is no way of telling which people will respond well to the treatment
  3. **Injection of hyaluronic acid** is helpful in knee OA, but needs to be done weekly for three to five weeks
  4. **Strong painkillers** such as narcotic drugs (morphine etc) may be helpful but the risks of side-effects, addiction and abuse are an issue
  5. **Arthroscopy and washing out** the joint with saline solution can be effective in knee OA but the reason for this is not well understood
  6. [Total knee replacement](#) and [total hip replacement](#) (internal links in this site) are highly effective treatments for hip and knee OA, resulting in great improvements in the function and quality of life of these people. The success rate of TKR has risen to match that of hip replacement as a reliable operation

### **The Future for OA**

Research into OA is very active and has increased the understanding of this condition over the last decade. New drugs are coming forward to control the pain symptoms or to alter the disease and its progression.

Some people with restricted areas of damage to the joint cartilage can have their own cartilage grown into a graft to replace the damaged region. This is known as [Autologous Chondrocyte Implantation](#)

### **Finally, Effective Treatments for Rheumatoid Arthritis**

Up until recently doctors have been working somewhat in the dark when treating this common and disabling condition.

This is because we had little understanding of the underlying reasons for the condition and so could not target treatments to the causes of the disease.

### **Rheumatoid Arthritis**

Rheumatoid arthritis is a common and very troublesome disease. It affects one in a hundred people in the UK, causing a reduction in life expectancy comparable to Non-Hodgkin's Lymphoma or three artery Coronary Heart Disease. So it's an important condition and the cause of significant pain, distress, disability and some shortening of life.

### **Scientific Research**

The important change over the last few years is that a revolution in the understanding of the underlying mechanisms for the disease has occurred. This, along with new and powerful drugs, has enabled rheumatologists to directly target the disease processes. The results have been startlingly good.

### **Inflammation - The Scientific Basis**

This is complicated. As part of the immune response, white blood cells (WBCs) take in proteins and break them down into peptides. With these the WBCs form structures called Major Histocompatibility Complexes (MHCs) on their surfaces. T-lymphocytes recognise these MHC and peptide combinations and secrete cytokines. Cytokines are chemical messages from one cell to another and can be thought of as local hormones.

### **Cytokines Influence Inflammation**

Cytokines are chemicals with low molecular weights and act as inter-cell messengers. They are essential for the ability to develop immunity. Some cytokines increase inflammation in the tissues, others decrease it and it is the balance between the two which determines the state of inflammation in the person.

### **TNF Alpha**

Tissue necrosis factor alpha (TNF Alpha) is one of the most powerful increasers of inflammation in rheumatoid joints. High levels of this chemical have been found in RA joints and the levels of TNF Alpha relate well to the levels of pain the individual is suffering from. This indicates that the TNF levels are an important indicator of what is going on in inflamed joints, as well as being significantly responsible for causing the inflammation.

TNF makes cells produce more cytokines and this can increase the inflammation greatly. Anyone who has had a severely inflamed joint (just one is enough) knows just how bad that can be.

### **Anti-TNF Drugs**

Once the importance of TNF was realised, the drug companies worked to develop drugs which would inhibit the production of TNF. Available at the moment are Infliximab, Adelinimab and Etanercept. These are either given intravenously or injected just under the skin. There is no oral treatment for these compounds yet.

Many cells have TNF Alpha receptors on their surfaces, areas which accept TNF Alpha chemicals produced by other cells and which causes the receptor cells to become inflamed. In the same way, many cells produce TNF Alpha. The drugs capture and bind the TNF Alpha molecules and prevent the receptors from receiving them, thus reducing the inflammation in the cells.

### **Good results from TNF Blockers**

The results of previous treatments for rheumatoid arthritis were really not that good. On average only 52% were 20% better within one year and 35% better within ten years. By 5 years from the start of treatment, 64-78% of people had stopped taking their treatments.

The results of treatment by TNF blockers are MUCH better. Doctors can now seriously talk about inducing remission (stopping the disease activity) in rheumatoid arthritis for the first time.



### **The State Of The Art**

TNF Alpha is a pro-inflammatory (promotes inflammation) cytokine for which there are now highly effective inhibitors available. In ankylosing spondylitis the results are good too, with an especial improvement in low back pain at night, a very useful property of these drugs. They might also have a role to play in sciatica, migraine and complex regional pain syndrome, but it is not clear yet how useful they will be.

### **Glucosamine and Chondroitin**

Glucosamine and chondroitin have been shown to have some beneficial effects on osteoarthritic joints, and so may be worth trying if you have this kind of joint problem. You can try this type of product by clicking on the image for this liquid form of glucosamine, said to have a much faster and more complete uptake than capsules.

[Osteoarthritis \(OA\)](#) is the most widespread type of arthritis, a degenerative condition of the joints. Acute inflammation is uncommon in OA and it is mostly a “wear-and-tear” disease involving degeneration of joint cartilage and the formation of bony spurs in various joints.

Joint trauma, repetitive joint stresses in jobs, and obesity are risk factors. OA is very common over 60 years of age, but not always troublesome.

You will have seen advertising and promotion of glucosamine and chondroitin as a treatment for OA.

### **What are these substances?**

**Glucosamine**, an amino sugar, is a natural substance made by your body, an essential building block of joint cartilage, ligaments, bones and blood vessels, and is thought to promote the formation and repair of cartilage.

**Chondroitin**, a carbohydrate, is a natural cartilage component linked to levels of water retention and elasticity and to the inhibition of enzymes that break down cartilage. Both compounds are manufactured by the body.

You can buy both these dietary supplements as tablets from your local health food shop or chemist and they are often taken together.

### **What does the research say?**

Glucosamine may stimulate the production of cartilage-building proteins and chondroitin may inhibit the production of cartilage-destroying enzymes and fight inflammation. The shells of shellfish are the source of glucosamine, while chondroitin supplements are extracted from the cartilage of cows.

Studies on people have shown that both may relieve arthritic pain and stiffness with fewer side effects than conventional arthritis drugs. However, there isn't enough good research to know whether their use is sensible. The manufacture of these kinds of supplements is not regulated and product quality, especially of chondroitin products, is not predictable.

### **So, does glucosamine and chondroitin work?**

We don't really know as there isn't any convincing evidence that glucosamine or chondroitin help to ease the symptoms of osteoarthritis. There is some weak evidence that glucosamine, or a combination of glucosamine and chondroitin, might be helpful and no evidence that taking chondroitin on its own is helpful.

Glucosamine may help by reducing pain and stiffness rather like a non steroidal anti-inflammatory drug (NSAID) and some trials have shown that glucosamine, or glucosamine plus chondroitin, can help to control the symptoms of osteoarthritis. However, these trials have faults in them which make the results unreliable. So it is difficult to be sure whether these treatments work or not.

Just keep in mind that there isn't any definite proof (or even good evidence) that either of these supplements is useful in treating osteoarthritis.

### **Products**

In the US, glucosamine and chondroitin products are marketed as “dietary supplements”. Glucosamine is available in many forms, including glucosamine sulfate, glucosamine hydrochloride (HCl), and N-acetylglucosamine (NAG), and have various other contents. However, there appears to be no conclusive evidence that one form is better than another.

### **The safety of the substances**

No serious side effects from either glucosamine or chondroitin have been found in the trials to date.

### **Do the experts agree?**

The use of these agents is thought to be reasonable but more research is needed to place them in their proper roles. There is disagreement about how practical or sensible it is to use them now.

### **Is there a bottom line?**

It is difficult to make a decision about using these agents because the information is far less convincing than desirable. Quality control of the products is also a significant problem, with the chemical makeup varying with different brands.

It's not clear whether they actually do work at all but they could help the body make new joint cartilage and to repair damaged cartilage.

### **What should you do?**

- **Get a concrete diagnosis** from a competent physician.
- **Discuss the benefits and potential risks** with your physician
- If you decide to try the compounds, **ask your physician for guidance on dosage/frequency** etc.
- Get your doctor's help, or the help of Consumer reports or Consumerlab.com, in choosing a product.
- **Ignore all "miracle cure" claims for arthritis.** Anything that seems too good to be true, is.
- **Don't buy products in response to junk mail, tv or other advertising,** and check carefully for price and good value. It won't be cheap, even if it helps.
- **Do not trust any seller of dietary supplements, herbs, or homeopathic remedies** to give you impartial advice about whether you should use their products.
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### **You want to see the evidence?**

Go to [Best Treatments](#) and [Clinical Evidence](#) and put "glucosamine" or "chondroitin" into the search boxes. Both these useful sites give reference lists to the medical evidence.

[ConsumerLab](#) is a very useful site, with analysis of all the evidence and also of the products. Some products don't have any of the substance in them that they claim to have!

If you'd like to think about the issues and make an informed decision, the **US Food and Drug Administration Centre for Food Safety and Applied Nutrition** has issued a document [Tips for the Savvy Supplement User: Making Informed Decisions And Evaluating Information](#) which may be of interest.

### **Viscosupplementation for osteoarthritis of the knee**

Osteoarthritis is the most common form of arthritis in the world, affecting huge numbers of people and is a major cause of disability. As industrialized populations become older and live longer, the effects of osteoarthritis (OA) will become more marked.

New treatments are continually being developed as the understanding of OA moves forward rapidly.

#### **Introduction**

The synovial fluid is the fluid secreted by the lining of the knee and other synovial joints (most of our joints are of the synovial type). This fluid provides a useful function in the life of our knees.

One of the main constituents of synovial fluid, hyaluronic acid, gives viscosity and elasticity to the fluid, allowing it to improve the way joints function.

In OA this viscosity and elasticity is reduced, and this may contribute to the abnormal functioning of the joint. Viscosupplementation has been developed to replenish the hyaluronic acid part of the synovial fluid. This has shown some promise in improving the pain and abnormal function of osteoarthritic knees.

Experiments have shown that adding hyaluronic acid to the cells in human synovial membrane stimulates them to produce hyaluronic acid themselves.

Hyaluronic acid as a lubricant and shock absorber in the synovial fluid. It is not toxic when injected, has few side effects and has a rapid onset of action.

#### **Reason for using this technique**

The concentration and molecular weight of hyaluronic acid in osteoarthritic joint fluid is reduced. Normal viscosity of the synovial fluid is vital to joint lubrication and is thought to have protective effects on the joint cartilage.

It is suggested that the changes in the synovial fluid in OA joints makes the joint cartilage more likely to be injured by physical or chemical stresses.

#### **The aim of treatment**

Injecting the materials into the joint is intended to increase the concentration and molecular weight of the hyaluronic acid towards the normal. The aim is to make the joint chemistry resemble more closely that of normal synovial fluid.

#### **How does it work?**

The mechanism of action of this therapy is not clear. A substance introduced into the knee may have a cushioning effect, but is thought not to last very long in the knee. However, its effect of stimulating normal production of hyaluronic acid from the joint lining could have longer term effects, including inhibiting the joint's pain nerves from firing.

Hyaluronic acid may increase joint lubrication, control swelling and may encourage the production of cartilage.

#### **Research work**

Injection of hyaluran preparations has shown significantly greater pain relief than injection of a placebo, the effect is as good as taking anti-inflammatory medications. There is better pain relief than injection of steroids, and although this takes longer to develop it also lasts much longer.

#### **Arthritis cost of treatment**

Bobic (2003) showed the price of a course of injections costs £200-300 sterling, the average time of pain relief was seven months and 10% of people did not get any real pain relief. There were no significant complications.

#### **Is the procedure safe?**

Infection risk is very low if normal sterile technique is used. The treatment has no overall body effects so is an attractive treatment option for osteoarthritic knees. Overall the substances used are non-allergenic, non-toxic and do not cause inflammation.

Only Hyalgan™ has shown instances of anaphylactic shock-like reactions. Treatment can be followed by a few days of redness, pain, warmth and swelling, with occasional more severe inflammatory reactions needed steroid injection.

It may be unwise to inject patients who are sensitive to hyaluran materials or bird proteins, who have an infected area around the injection site, have circulatory problems in the leg or if there is strong inflammation present.

#### **Summary**

OA costs enormous amounts of money and if this treatment reduces or puts off the need for arthroscopic surgery or total knee replacement, there could be a considerable cost saving. This treatment seems to be developing into an important treatment for OA joints.

#### **Links about arthritis**

Arthritis Care [www.arthritiscare.org.uk](http://www.arthritiscare.org.uk)

Complementary Medicine Association [www.the-cma.org.uk](http://www.the-cma.org.uk)

National Ankylosing Spondylitis Society [www.nass.co.uk](http://www.nass.co.uk)

Ankylosing Spondylitis is one of the commonest arthritic diseases, especially amongst young men. Although not usually severely disabling, it can have a big effect on a person's life.

National Osteoporosis Society [www.nos.org.uk](http://www.nos.org.uk)

Arthritis Research Campaign [www.arc.org.uk](http://www.arc.org.uk)

The ARC is the fourth largest medical charity in the UK and had an annual income of £26m in 2001-2. It funds research into all the different kinds of arthritis and provides information for professionals and the public.

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Arthritis Researchalot.com. Resource site for everything to do with arthritis. Full of newsletters, articles, links and other resources - ALL FREE - in one easy to navigate site to save time and money.

Arthritis Resources. Comprehensive information. A comprehensive site devoted to arthritis and degenerative joint disease. [www.arthritisedu.com](http://www.arthritisedu.com)

**Please visit [www.orthopaedics.co.uk](http://www.orthopaedics.co.uk) for more information.**

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