

## Bone Disease and New Prevention Borders Chapter 2: Osteoarticular Pathology

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Received: 18 Feb 2022; Accepted: 20 Mar 2022; Published: 25 Mar 2022

**Citation:** Riccardi B, Resta S. Bone Disease and New Prevention Borders Chapter 2: Osteoarticular Pathology. Int J Biomed Res Prac. 2022; 2(1); 1-9.

### ABSTRACT

*In this second chapter, we are going to address the controversial topic of osteoarticular diseases of an inflammatory and degenerative nature that has a high incidence and a frequent feedback in advanced age and high social and health costs. We will focus our attention on the description of the pathogenic processes responsible for osteoarticular diseases, highlighting the fundamental role that collagen degenerations play in these. We are going to examine various options proposed for the prevention and treatment of diseases indicated with medications and food supplements. We are going to present a special description on the effects of Silicon, in particular, Organic Silicon G5, on these pathologies, until now poorly considered, and we will propose our own formulation composed of Silicon G5 plus trace elements. Finally, we are going to show the results obtained with this formulation on a consistent patient case history.*

*Thanks to the results obtained, we propose to adopt our supplement, as an alternative or as an adjuvant treatment, to the drugs most used drugs in these diseases with the double advantage of reducing the dosage and the side effects of the latter, and improving its anti-inflammatory effectiveness with the synergistic activity obtainable with the two principals.*

### Keywords

Osteoarthritis (OA), Arthritis, Arthritis, Synovial membrane, Extracellular matrix.

### Introduction

We must make an important conceptual and methodological distinction between osteoporotic pathology and osteoarticular pathology. While osteoporosis is a metabolic pathology that affects the structural component, both organic and inorganic skeletal apparatus, osteoarticular pathology, arthritis, arthritis, rheumatism, etc. concerns more specifically the bone joints in all their components [1-3].

In this second part, we are going to discuss and describe the structural and functional aspects of the joints and the pathological changes that affect them. Osteoarticular pathology is a pathological process of an inflammatory/degenerative nature that originates from the loss of the physiological balance between catabolic phenomena and reparative phenomena at the level of the articular

cartilage of the synovial joints as a whole [4,5]. With the synovial or diarthrodial articulation, we indicate the anatomical-functional unit formed by the epiphysis of the bone segments covered by articular cartilage placed inside a fibrous containment capsule and by the synovial fluid, which acts as a lubricant Figure 1.

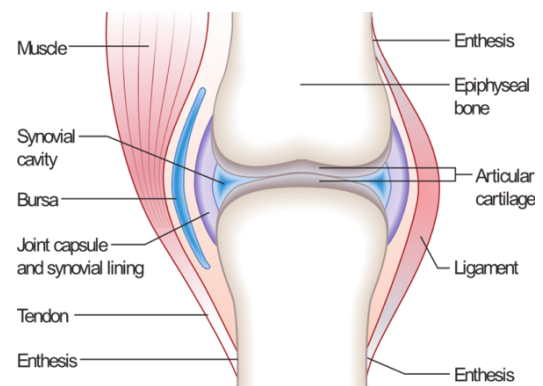


Figure 1: Diagram of a healthy joint.

### Micro joint environment

The articulation of the bones can be considered, together with the osteone, as the fundamental anatomic-functional unit of the skeletal apparatus. It is made up of a set of structures that have an anatomical, submicroscopic and molecular configuration that are complementary to each other that ensure perfect biomechanical integration. The combination of interactions between articular cartilage, synovial membrane and synovial fluid condition, even in pathological situations, the damage and its progression in osteoarthritis.

The current pathophysiological framework of osteoarthritis integrates morpho-functional, ultrastructural, biochemical and immunological knowledge of the "joint environment" in a global context of the pathology that identifies osteoarthritis as a pathological expression of wear, flogosis and joint immunological imbalance [6,7].

Inflammatory pathologies of the skeletal apparatus most frequently found belong to the group of rheumatic diseases and are distinguished in two main classes Arthrosis and Arthritis that collect the widest case studies with the highest incidence and prevalence among all osteoarticular diseases. We will therefore deal particularly with these.

### Arthrosis and Arthritis

They are two very different diseases, but they are often confused [1]. Both fall into the broader category of rheumatic diseases, both affecting the joints, and both are characterized by pain accompanied by stiffness and restriction in the movements of the affected joints. These are two very distinct problems, with different causes, different treatments and different ways of preventing them. In addition, the age of the affected subjects is different. If the arthritis in fact is an inflammation that can affect anyone, the arthritis arrives with the age. But we understand better what are the characteristics of these two diseases and the criteria to distinguish them.

### Arthrosis (or Osteoarthrosis)

Arthrosis is a degenerative disease of the articular cartilage (bone lining surface), which affects chondrocytes and occurs especially after the age of 50. The cartilage degrades with the passage of time and meets a destruction that involves nearby tissues and the same articulation. It causes a variable degree of functional limitation and has a negative impact on the quality of life. When the cartilage is worn, until it disappears, the bones in the joint movement friction one on the other and are damaged. This causes pain, swelling and remodeling of the bones and joint ligaments. To be affected are mainly the knees, the hips, the small joints of the hands, the cervical and lumbar spine [2].

### Arthritis (or Osteoarthritis)

Arthritis is an inflammation of the joint that can be caused by different factors and can develop at any age, even in children. It is much faster in the onset than arthrosis, involves the synovial membrane (the inner lining layer of the joint capsule), then hit,

and destroy, later, the cartilage. It is characterized by swelling, redness, stiffness, increased temperature in the affected area and pain that can also lead to the loss of motor capacity of the affected joints [3,4].

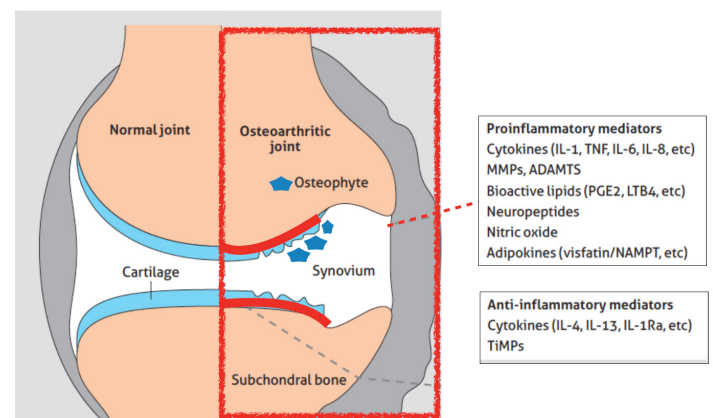
### Pathogenesis

In arthritis there is not a widely recognized cause of the inflammation that is at the base of it and that if it is not treated adequately, it can worsen over the years. There are several types of arthritis, including rheumatoid arthritis (also in juvenile form), fibromyalgia, gout, and arthritis in connective diseases such as systemic lupus erythematosus.

### The cartilage is a target and a pathogenetic protagonist.

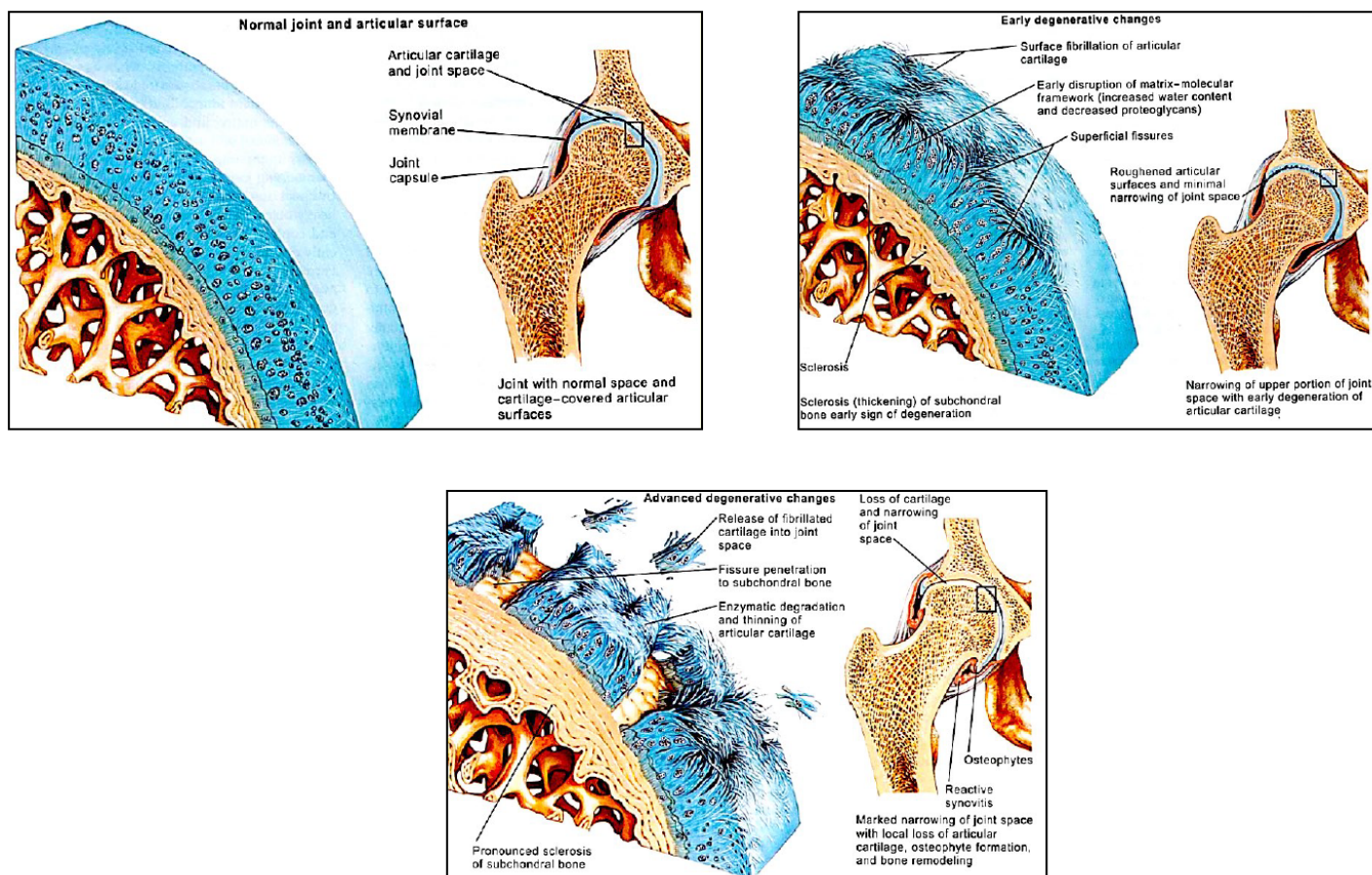
Sinovia, bones and cartilage form a single anatomical-functional entity in which all tissues can be affected by the pathological mechanisms that occur in osteoarthritis. Local anomalies are interlinked and interdependent in these compartments, so that the alteration of a component leads to a progressive degeneration of the entire articulation. However, cartilage has traditionally received the most attention in the study of OA because of the gross damage found in pathological findings and imaging studies, and the multitude of biochemical processes that are activated [5,6].

Therefore, among the structural elements involved in Osteoarticular Pathology, cartilage degradation is considered the central feature. That is because articular cartilage is anatomically at the forefront of responding to the local biomechanical environment, with the specific task of absorbing and distributing the mechanical loads applied to the joint and of providing a low friction system to allow mobility Figure 2 [7].



**Figure 2:** Our schematic representation of cartilage degeneration and markers of inflammation and Involvement of the synovium in osteoarthritis pathophysiology.

The inflammation of the synovium in osteoarthritis is responsible for several clinical symptoms, including pain, and reflects the structural progression of the disorder. Furthermore, synovitis is a major factor in osteoarthritis pathophysiology due to the action of several soluble mediators. Interestingly, the relationship between synovitis, as assessed by arthroscopy and the degree of functional impairment or pain experienced remains a matter of debate.



**Figure 3:** Images of progressive cartilage erosion - Modified by *Focus on osteoarthritis* by F.Rossi.

According to this hypothesis, the key events that occur in cartilage during the pathogenesis of OA include an imbalance of metabolic and degrading signals, driven by cascades of cytokines and the production of inflammatory mediators. Chondromytes, as well as synovial cells of OA patients produce increased levels of inflammatory cytokines, such as interleukin-1b (IL-1b) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), which in turn decrease the anabolic synthesis of collagen and increase the catabolic phase (including matrix metalloproteins or MMP) and the production of other inflammatory mediators such as IL-8, IL-6, prostaglandin E2 and nitric oxide (NO) [8].

Highly regulated anabolic and catabolic mechanisms maintain and adapt cartilage to disruptive factors. In OA, dysregulation caused by the presence of various bio factors leads to the loss of cartilage homeostasis, resulting in degradation of the collagen and proteoglycan-rich extracellular matrix (ECM), fibrillation and erosion of the articular surface, cell death, matrix calcification, and vascular invasion Figure 3.

More in-depth investigations have been carried out to identify links with the genetic causes responsible for these diseases, several genetic indices have been identified which are responsible for certain degenerative forms [9,10]. However, in view of the fact that cartilage does not have its own vascularity and innervation, and

therefore cannot be considered, as the site of metabolic activity, but it must necessarily depend for all its needs on structures adjacent to it and physiologically related to it.

This role can be fulfilled by the synovial membrane, as the regulating organ of the physiological homeostatic activity of the articulation as a whole. Two layers, the fibrous membrane and the synovial membrane form Sinovia. The fibrous membrane is the more external and tougher and is continuous with the perichondrium and periosteum of the bones forming the joint. The synovial membrane forms folds and synovial villi, which project into the joint cavity. It has its own vascularity. The synovial membrane secretes and reabsorbs the synovial fluid or synovia that fills the articular cavity. It contains hyaluronic acid, lubricin, electrolytes, carbohydrates and enzymes. Therefore, this viscous liquid is responsible for articular cartilage nutrition and is necessary to lubricate reducing friction between articular surfaces. In some joints, large amounts of adipose tissue called intra-articular fat pads are found between the two membranes of the articular capsule [11].

The synovial fluid (synovia), which fills the joint space and provides nutrition, lubrication and shock absorption for the cartilage, is a viscous fluid that is rich in hyaluronic acid and other glycosaminoglycans as well as in different specific synovial proteins (e.g., lubricin). Notably, under homeostatic conditions,



the synovial fluid as well as the cartilage surface, completely lacks immune cell trafficking, although macrophages heavily populate the surrounding synovial tissue. Thus, the synovial membrane is responsible for the production, absorption and regulation of synovial fluid and mediators of joint inflammation [12].

### Diagnosis of Osteoarticular Diseases

Different diagnostic tests are used depending on the type of pathology to be examined.

### Diagnosis with Radiography

The diagnosis of osteoarthritis is made by radiological examinations (X-rays and any CT or MRI). The most important radiological aspects are the reduction of the space between the two bony heads (intra-articular space) and the osteophytes, small bony spurs that are observed along the articular rhyme [13]. Arthritis is not an inflammatory or infectious disease as arthritis are, there are no specific laboratory tests; however in some cases arthrocentesis may be required for the analysis of synovial fluid to exclude irritating elements or pathologies of different nature.

### Diagnosis with Biomarker

With regard to arthritis, however, blood chemistry tests of specific biomarkers are also useful to assess the degree of joint inflammation and its evolution. Should we consider Biomarkers as the cause or effect of the inflammatory process. The evidence of altered concentration of the inflammatory mediators in the affected joints occurs only AFTER or at the same time as the observation of the inflammatory state and not BEFORE, therefore the mediators of inflammation are actually a response of the organism to the noxa pathogen, in an attempt to defend and repair the damage. Biomarkers therefore have an initial diagnostic value and when they increase or decrease during the pathology they become prognostic, predictive of the evolution of the disease [10].

The goal of OA biomarker research is to develop tests that are predictive. According to the World Health Organization a biomarker is, "any substance, structure, or process that can be measured in the body or its products and influence or predict the incidence of outcome or disease" Biomarkers can be found in biological fluids, including urine, serum, feces, lymph, and synovial fluid. Serum biomarker research has been primarily focused on cytokines, Interleukins (IL), proteins and miRNA molecules [9].

### Physical Examination

Symptoms and signs of joint pathology detectable in the clinical examination are:

Pain, stiffness and alteration of joint profile, functional deficiency, Movement limitation, Motion pain, swelling and soft tissue deformity, Atrophy/ Muscular weakening.

They are useful for assessing the degree of impairment and the effectiveness of therapeutic treatments on the evolution of osteoarticular pathology. The physical exam can be used to determine how much pain is present, and to what degree mobility has been compromised [14,15] Figure 4.

### Therapy

The rapidity of progression of the arthrosic process presents a wide inter-individual variability. The four most often-considered indices to assess the improvement of the disease are pain, the overall assessment of the patient about his condition of disease, the range of movement of the affected joints and the doctor's overall assessment of the disease status. They follow in the order: the rigidity of the joint, the influence of the disease on sleep, the travel time of fixed distances, the interference of the disease with the normal daily activities, the joint pain, the consumption of analgesic, the joint swelling. There are also significant gender differences in the propensity to develop one type or another of osteoarthritis. Lupus, rheumatoid arthritis, scleroderma and fibromyalgia are much more common among women. This difference is indicative of the fact that both hormonal production and other factors associated with a person's sex may play a role in the disease.

The studies focus on clarifying the causes and risk factors of individual forms of arthritis, although it is not always possible to make a clear distinction between the factors that determine one form or the other. It is worth repeating that, except in the case of arthritis of infectious origin, no definitive treatment of the disease exists to date. Fundamental are the preventive measures to be taken to control the progression of the disease. Among these, particular emphasis has an adequate diet and physical activity regimen that can effectively reduce the development and impact of the disease. This is particularly true for those forms, such as osteoarthritis, which occur in old age, on which weighs particularly the lifestyle of the person. There is no definitive cure for arthritis. However, several treatments can improve the quality of life of the patient.

**Currently available medications are:** Non-steroidal anti-inflammatory drugs (Nsaids), Analgesics, Intra-articular therapy, [16,17]. In addition, among the supplements we remember Glucosamine sulphate, Chondroitin sulfate, Hyaluronan (Hyaluronic acid or HA), S-adenosylmethionine (Same) [18]. In the most serious cases, it is possible to use surgery for joint replacement. In this study, we are going to focus on the use and usefulness of supplements in Osteoarticular diseases, focusing on the description and examination of the effects obtained by the formulation of our Supplement Silicon. In the first chapter of our manuscript, which has the same title, we have described the composition and mechanism of action of the single components of Silicos, on the pathogenesis of Osteoporosis, highlighting in particular the fundamental role of Organic Silicon G5. Here we are going to discuss the possible mechanism of action of the same components of our supplement, individually examined, in countering the evolution of the Osteoarticular disease.

### Extracellular Matrix, Primum Movens of the Degenerative Articular Process

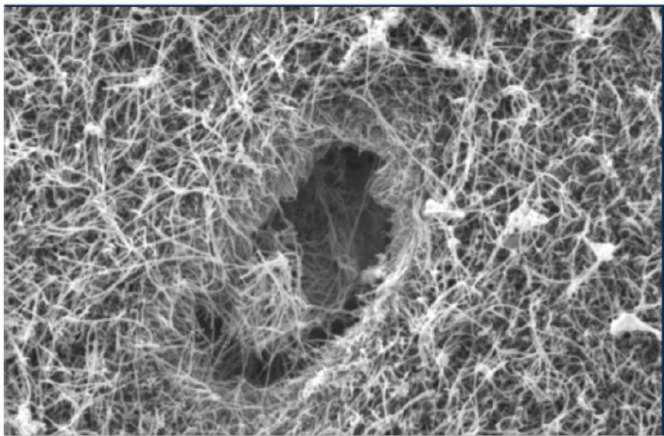
On the basis of the knowledge described above in the paragraph on the pathogenesis of osteoarticular diseases, the fundamental role of cartilage degeneration and the fundamental component of this represented by collagen is evident. Ultimately, the first structure to be compromised in the initial pathogenetic process of the joints is collagen. This is particularly evident for those non-inflammatory forms of the joint, such as osteoarthritis [11].

### The fundamental components of the joint

The Extracellular Matrix (ECM), a complex structure formed by numerous proteins such as Proteoglycans, Hyaluronan (HA), glycoproteins (fibronectin and laminectin) and fibrous collagen protein and elastin represent cartilage, synovial fluid and subcondral skeletal tissue [19]. Proteoglycans, have as fundamental constituent a polysaccharide called Glycosaminoglycan, GAGs linked to a protein. Despite its simple structure the Hialuronano has an important role in main functions, such as intercellular messages, cell development, inflammation, healing of wounds and contributes to the maintenance of tissue homeostasis through interaction with other essential structures of the extracellular matrix [20].

The interaction between the tissues that make up the joint, cartilage, the subcondral bone, synovial capsule are essential in the determinism of the pathogenesis of osteoarthritis, characterized by the remodelling of the extracellular matrix in the inflammatory environment. Modern genetic typing approaches have allowed the identification of two types of osteoarthritis and have provided the molecular sequence of two different tissue-specific osteoarthritis, allowing a better understanding of the etiopathogenesis of this disease [21] Figure 4.

#### EXTRACELLULAR MATRIX (ECM)



**Figure 4:** TEM extracellular matrix microphotography – (From GMV, Osteoarthritis Care & Research).

### *Synergistic activity of the individual components of Silicos*

In the previous chapter, we reported the results obtained with our supplement in osteoporosis.

In this chapter, we are going to examine the effectiveness of SILICOS in the treatment of osteoarthritis. Also in this study, we used SILICOS with the same composition:

Organic silicon G5, Magnesium, Zinc, Vitamin D3, Vitamin K2, Bromelain and with the same dosage of a sachet a day for six months.

As mentioned above, the complexity of osteoarticular pathology involves both degenerative processes and inflammatory mechanisms, and then we will summarize the activity of the individual components of our formulation on both pathogenetic processes. We have already described the role of the Extracellular

Matrix (ECM) in the pathogenesis of osteoarticular diseases, focusing on its fundamental constituents. We also have reported the activity of the individual components of the formulation in preventing and countering the pathogenic evolution of the connective matrix, so we will not discuss this here. Instead, we will examine in extreme synthesis, how those same nutrients act in countering the inflammatory process.

### Organic silicon G5

Also as anti-inflammatory silicon has shown an effectiveness in containing the production of interleukin 6 IL-6 proinflammatory mediators, Tumor Necrosis Factor alpha, and nitric oxide [22-24].

### Vitamin K2

Promotes gamma-carboxylation of the glutamic acid in osteocalcin is vitamin K dependent and involves the conversion of glutamic acid residues (Glu) to gamma-carboxyglutamic acid residues (Gla). In addition, Vitamin K has been shown to have safe anti-inflammatory activity in chronic diseases of elderly patients and osteoarthritis [25].

### Vitamin D3

Together with the two previous components, it helps to improve osteosynthesis of the sub-chondral bone and to prevent pathogenic degeneration dependent on osteoarthritis and stabilize bone remodeling. An anti-inflammatory activity of vitamin D3 has also been documented in various diseases [26,27].

### Zinc

Zinc supplementation upregulated A20, a zinc transcription factor, which inhibited the activation of NF- $\kappa$ B, resulting in decreased generation of inflammatory cytokines. Zinc is very effective in decreasing reactive oxygen species (ROS). Zinc in human plays an important role in cell mediated immunity and is also an antioxidant and anti-inflammatory agent. Zinc supplementation studies in the elderly have shown decreased incidence of infections, decreased oxidative stress, and decreased generation of inflammatory cytokines. Is most often associated with its antioxidant properties? However, this is just one of many possibilities, including the influence of zinc on the immune system, transcription factors, cell differentiation and proliferation, DNA and RNA synthesis and repair, enzyme activation or inhibition, the regulation of cellular signaling, and the stabilization of the cell structure and membranes [28-31].

### Bromelain

Experimental evidence suggests that bromelain's action as an anti-inflammatory is mediated via the following factors:

- 1) by increasing serum fibrinolytic activity, reducing plasma fibrinogen levels and decreasing bradykinin levels (which results in reduced vascular permeability) and hence reducing oedema and pain;
  - 2) by mediating prostaglandin levels (by decreasing levels of PGE2 and thromboxane A2); and
  - 3) through modulation of certain immune cell surface adhesion molecules, which play a role in the pathogenesis of arthritis [32-35].
- We have summarized the expected synergy effect with our formulation in Table 1.

Single or synergic activity of the components of the formulation on mediators of inflammation	Zinc , Bromelain , Vitamin D3 , Vitamin K2	Organic Silicon G5 , Vitamin D3 , Vitamin K2 ,Zinc	Organic Silicon G5 , Vitamin K2	Zinc , Bromelain , Vitamin D3	Bromelain , Organic Silicon G5
	Inflammatory Agents	Degradation of the Cartilaginous Matrix	Matrix Degradation Subcondral Bone	Capsule and liquid Synovial	Symptoms
<b>PATHOGENESIS</b>	Increased levels inflammatory cytokines, interleukin-1b (IL-1b) tumor necrosis factor-a (TNF-a), decrease anabolic collagen synthesis Increased matrix metalloproteinases (MMPs) , IL-8, IL-6, prostaglandin E2 and nitric oxide (NO)	Alteration in collagen synthesis (decrease in type II/type I collagen ration) Reduction of Fundamental Substance and Proteoglycans, necrosis of superficial layers cracking and fibrillation of superficial cartilage	Subchondral bone demineralisation with microfractures Altered homeostasis of osteogenesis Imbalance activity Osteoclasts Osteoblasts, Collagen crosslinking	Narrowing of the joint space Hyperplasia of the superficial layer of the synovial membrane , with infiltration of lymphocytes and monocytes. Inflamed synovial tissue	Heat , Redness , Joint Swelling ,Pain Functional Impairment Difficulty in movement

Diagram of the anti-inflammatory activity assumed by the components

### Study Design and Methods

For our case studies we adopted the same design and method used in the previous work [36].

Simple open-label works with control of haematological and functional parameters (Data on reserved files) same inclusion and exclusion criteria, treatment duration, same functional evaluation scales of the results.

### Subjects

600 Caucasian osteoarthrotic patients divided into 307 women and 293 men with painful symptoms and musculoskeletal impairment of moderate to important, with a PAS -score < 40.

All study methods and procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki and Good Clinical Practice guidelines.

### Questionnaire and registration

Administration of a questionnaire for an anamnestic survey. The first part of the questionnaire relates to personal history, with regard to predisposing diseases.

### Other collected data

Age, ethnicity, smoking, physical activity, BMI, food (Confidential data)

### Criteria for inclusion

Patients 65 years or more of age; of both sexes who have been asked for informed written consent;

Patients enrolled with various degrees of Osteoarthritis and physicians checked other musculoskeletal diseases with routine examinations at the beginning and end of treatment.

### Criteria for exclusion

Patients were excluded according to the following criteria: Patient with infectious diseases of any nature, blood transfusions, renal failure as defined by serum creatinine > 200 µmol/L, abnormal serum ferritin level (normal range: 11–250 µg/L), concomitant medication treatments like: Anti-inflammatory drugs were excluded, those in treatment with anti-inflammatory drugs have been subjected to a two-month wash-out period before starting treatment.

### Duration of treatment

Patients were treated for six months at the dosage of one sachet a day. Patients with ineffective previous treatments have been included too. All study methods and procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki and Good Clinical Practice guidelines.

### Measurements

A basic clinical examination was performed at each visit including measurement of body weight, height, systolic and diastolic blood pressure and heart rate. Blood samples and single void urine samples were collected from fasting subjects at baseline and after 6 months supplementation to evaluate the safety parameters such as serum glucose, urea, creatinine, uric acid, and ferritin, total protein, cholesterol, triglycerides, HDL-cholesterol, LDL-cholesterol and total bilirubin, glutamic-oxalacetic transaminase (GOT) glutamic-pyruvic transaminase (GPT), gammaglutamyltransferase (gamma-GT).

### Performance Scale

We have used standardized scales to assess the clinical status of the patients: *Performance Activity Scale (PAS)* e *Scale Numerical Evaluation Pain (NRS)* Figure 5; Functional impairment; Stiffness in movements: To which was assigned a semi-quantitative value from 100 to 0, where 100 is good – 0 is bad: [10].



## Results

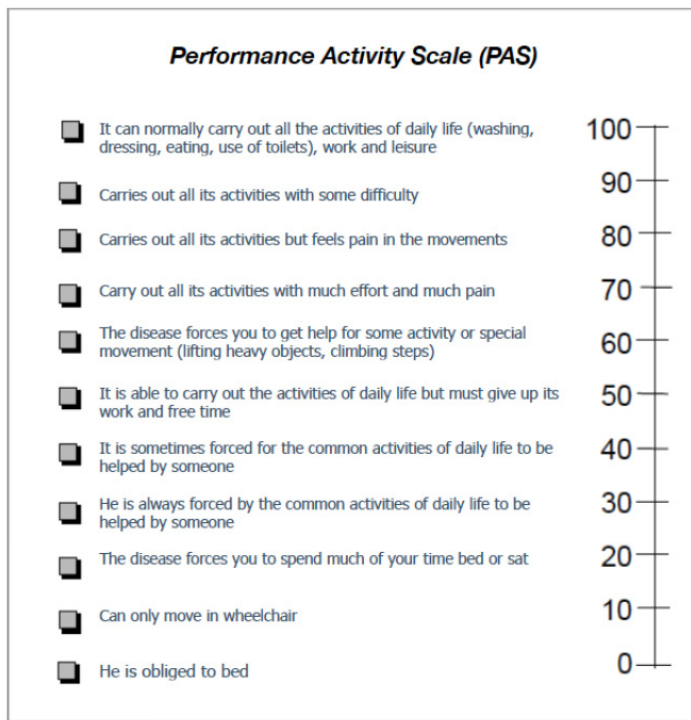
### Analog Performance Activity Scale (PAS)

We also measured, the Performance Activity PAS scale, which expresses the functional activity of patients, at the beginning and end of the observation period, Table 2. We have recorded in both treatment groups a significant improvement in performance after 6 months and, with a greater significance, even 12 months from the start of treatment, Data Not reported.

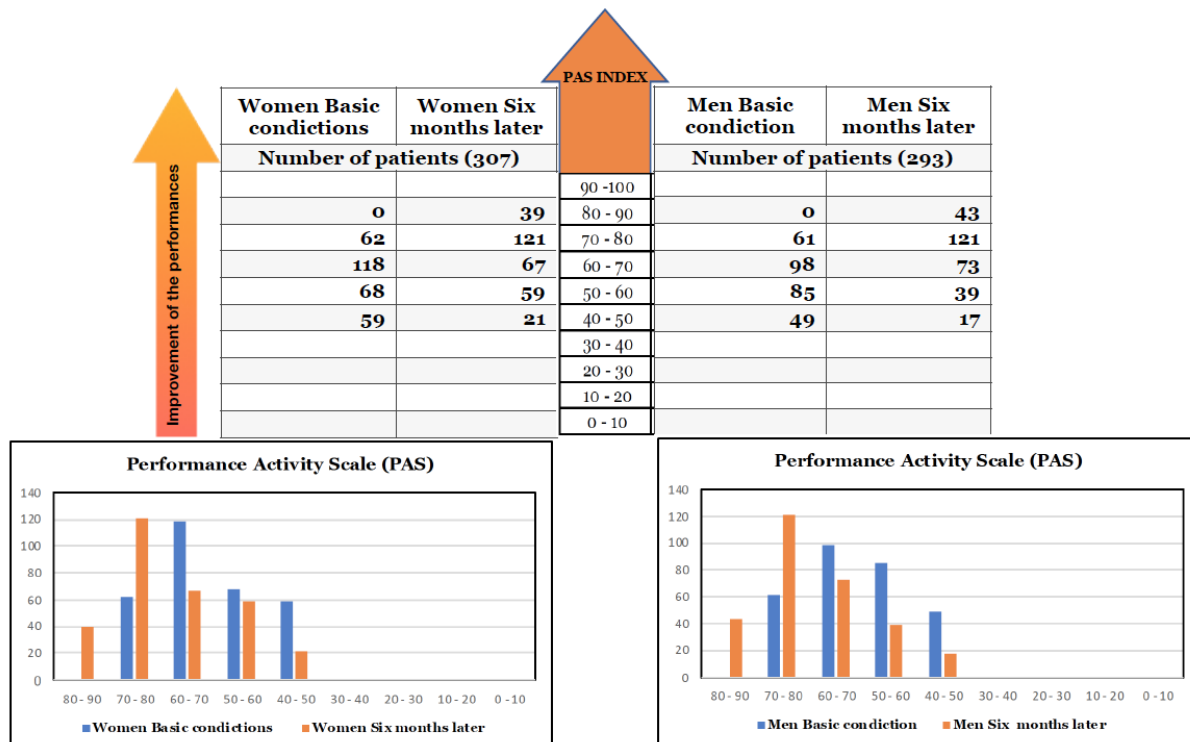
This clinical examination is the most objective and reliable in absolute, because it expresses the degree of functional recovery obtained by patients, which is the fundamental goal of therapeutic treatment.

### Analogue pain recording scale (NRS)

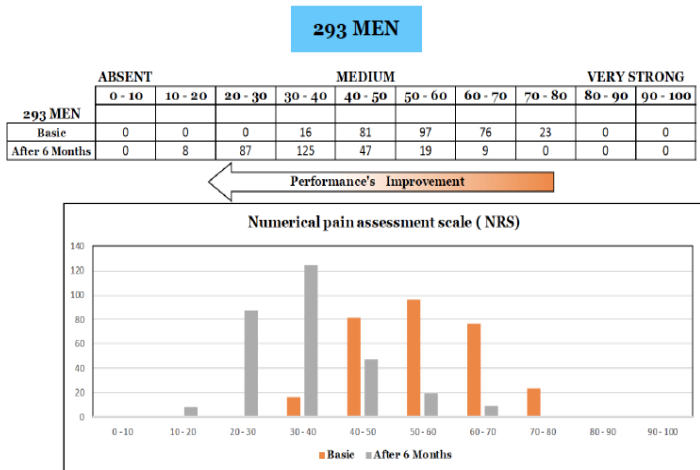
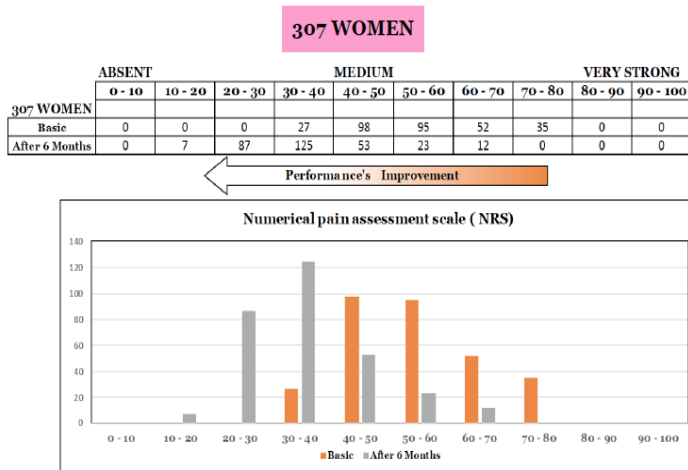
Another very important criterion in the evaluation of clinical improvement is the recording of pain reported by patients at the beginning and at the end of the observation period. This type of investigation, has an indicative value, and does not assume clinical relevance, but expresses an index of how the patient experiences the disabling discomfort caused by pain. However, if the measure of pain is related to the degree of freedom of movement achieved with treatment, it expresses a significant figure of functional recovery achieved and a prognostic index of the evolution of the disease. In fact, it is interesting to note that the values of the degree of performance and pain reduction evolve positively and in synchrony in the treated subjects Table 3.



**Figure 5:** Performance Activity Scale (PAS) – By Fausto Salaffi, Andrea Stancati, Scale di valutazione e malattie reumatiche, Mattioli editore.



**Table 2:** We divided the INDEX PAS into groups of 10 units each: 10-20, 20-30, 30-40, etc., both for the values recorded at time 0 and for the values recorded after six months. In each group are indicated the number of patients who recorded the relative indices: So for example in-group 40-50 are included respectively (59-21) female patients, and (49-17) male patients.



**Table 3:** Numerical pain assessment scale (NRS).

## Conclusion

Osteoarticular diseases are still today a diagnostic and therapeutic challenge, and there are many obscure points in the interpretation of the pathogenic processes responsible for their onset and evolution. As with other inflammatory and degenerative diseases, linked to the ageing of the population, the only viable way in dealing with a proper therapeutic path is represented by early diagnosis and prevention. We have little certainty about how to approach such a difficult, mysterious, and widespread disease, so much so that it takes on the characters of a pandemic. We know that the most effective prevention methods, indicated in all international guidelines, are healthy nutrition and constant physical activity. Once diagnosed, the most effective treatment is to counter the slow but inexorable negative evolution of the disease. We have several pharmaceutical devices; the most used medicines are the non-steroidal anti-inflammatory Nsaids, which however have poor therapeutic efficacy, because they are not able to change the evolution of the disease, even if they have a good symptomatic pain reliever activity useful in improving the quality of life of patients. Unfortunately, the Fans present, all indistinctly, the drawback of the numerous side effects, even very heavy. Therefore, their use must be limited in the duration of the treatment. A very useful alternative is offered by some supplements, which have a preventive value the more effective the earlier the treatment.

In this work, we have presented the results obtained with a supplement of our own formulation, for which we adopted as an innovative and original element the Organic Silicon G5, patented, flanked by other substances already known for their effectiveness and tolerability. Among the other advantages that we can highlight for our product, in addition to the good effectiveness and tolerability demonstrated by the results obtained, there is the positive advantage of reducing or replacing traditional anti-inflammatory drugs and adjuvant action with these, in the early stage of weaning. With the results obtained in our case studies with the use of the proposed formulation, we want to contribute in the prevention of osteoarticular diseases, to date orphaned therapies of proven effectiveness.

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