Equine Collagen Supplements

NDS®
Equine Nutrition

ALL NDS® EQUINE
COLLAGENS CONTAIN
100% COLLAGEN PEPTIDES

ALL NDS® EQUINE COLLAGEN PRODUCTS HAVE BEEN TESTED IN AN FEI-APPROVED LABORATORY

NDS
equine

Connective tissues in horses

The connective tissue comprises a combination of compound proteins (several different types of fibre – supporting, elastic and shock-absorbing) and some large sugar molecules, proteoglycans, linked together depending on the needs of the individual tissues. Thus, tendon membranes are thin and elastic, cartilage is dense, compact and shock-absorbing, part of the basic substance of the bones is light/porous and allows room for the incorporation of the mineral structure that makes the bones strong. The skin and tendons are elastic connective tissue that can be stretched. Ligaments and joint capsules are more fixed and keep the joints within their normal range of movement.

Seen as a whole, the connective tissue is a larger tissue than any other organ, and as such provides the actual basic structure and stability in the body.

Approximately 30% of all proteins found in the body are collagens.

Collagen also forms part of a wide range of communication processes, particularly with regard to regulating immune activity, and thus has an anti-inflammatory effect. Collagen peptides reduce the production of tissue-degrading enzymes.

Collagen build-up, wear & tear, recovery

There are around 16 different types of collagen, which consist of specific amino acid sequences for which there is no exact equivalent anywhere else in the body.

Collagen is formed from amino acids in the feed, which are ingested, absorbed and transported to the different types of cells, depending on the tissue concerned – for example, fibroblasts in the skin, chondroblasts in the joints and osteoblasts in the bones. All collagen is made up of amino acids provided in the feed. These amino acids are the same in all types of collagen – always glycine and, more often than not, proline and hydroxyproline (plus a few other amino acids), and these are bound together in long chains with over 1,000 amino acids; the precise sequence, however, is tissue-specific.

With age, and any (repeated or acute) stresses, the process of forming new collagen can no longer keep pace, whereupon the risk of non-specific inflammation, wear and actual damage increases:

- General inflammation, with tenderness, stiffness, fluid accumulation, and reactions to pain that cannot be attributed to specific tissues.
- Nutrition of joint cartilage occurs when the appropriate nutrients arrive in the blood supplying the joint tissue and are pressed into the cartilage during movement. If this does not occur, stiffness and tenderness arise.
- Tendons, tendon sheaths, fasciae and ligaments can become less elastic, and may need to be "got going" in the morning, particularly in the case of (older) horses that spend a lot of time in their box.
- Wounds and scratches do not heal as well.
- Risk of damage to joint cartilage, ligaments and tendons.

Prevention of injury in horses

Horses do not necessarily tell you when they become overloaded. It is the rider's responsibility to prevent micro-injuries before they develop into more serious, often long-lasting healing/recovery problems.

Optimal blood circulation, a prerequisite for tissue recovery and micro-injury healing, requires movement – i.e. paddock time, walks by hand, gentle movement, and by all means loose housing.

Balance in the movement pattern, i.e. correct tracking, disengagement and work where the weight is shifted backwards.

Movement on a varied (not heavy or deep) **surface,** including riding in the countryside and using the neck as a balancing pole and with freedom in the top line to carry the rider.

Sufficient warm-up and cooling at the walk, as the load from the rider's weight is doubled in trot and trebled in canter.

Saddle and rider in balance and symmetry.

Varied training in a rhythm, including strength training/dressage every other day, fitness training (including riding in the countryside) every other day and a few days of recovery each week. Training from the ground and lunging/coordination/pole work are fine.

NDS® Collagen products

The collagen products from NDS Equine Nutrition are characterised by being produced from pure Bioactive Collagen Peptides® for which the molecular weight, absorption by the body and incorporation in the relevant tissue have been documented.

It used to be thought that the digestion of proteins leads to their breakdown into amino acids before they are absorbed, but more recent research shows that molecules of sizes between 2 and 5 kDa (20–50 amino acids) can well be absorbed via the access routes located between the intestinal cells (the paracellular route), just as it has been documented that small peptides with 2–3 or more amino acids are absorbed well. Even whole small proteins with up to 200 amino acids can be absorbed intact and produce a biological effect at tissue level.

These collagen products are so specific that, after the hydrolysis process, which has broken down the very large amino acid chains, it is no longer possible to work out what the starting point was, and they also fall outside the current division into collagen types I, II and III. They have a unique structure that consists of collagen-specific Proline-Hydroxyproline-Glycine amino acid repetitions. Their form is such that they can travel from the intestine to the blood and beyond to the specific tissue that needs to be built up. Twenty-five per cent of the peptides are proline, which stabilises the structure so that they are not easily broken down during digestion.

When NDS® Equine Collagen products are ingested, approximately 10% of the molecule passes **intact and directly from the intestine** over into the body and out to the specific tissue, where it binds to receptors in the relevant connective tissue-building cells and emits a signal that sets the recovery process in motion. The remaining 88.4% is broken down by digestion to dipeptides and tripeptides as well as individual amino acids that are incorporated directly in the building and recovery process by the appropriate tissue in the body.

Therefore, specific collagen peptides work on two fronts as they

- send a communication signal to the connective tissue via the intact peptide (10%)
- supply the relevant, easily-incorporated amino acids and small peptides to the connective tissue that requires recovery and building (just under 90%).

Furthermore, NDS® Collagen Peptides have a very low content of the amino acid histidine (1%), which creates weak connections in the connective tissue (as opposed to proline, which creates strong connections). The negligible histidine content aids more intact absorption and there are almost no substrates that can be converted to histamine in the body.

Six different collagen peptides for horses

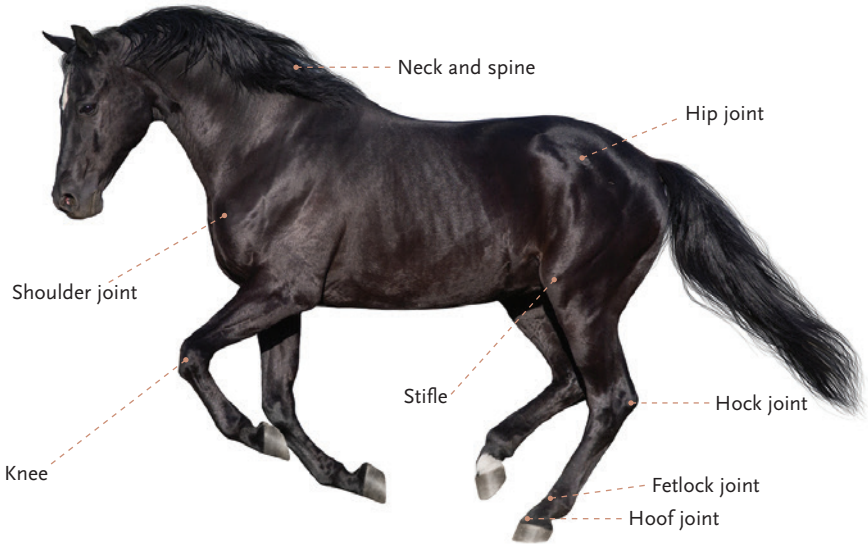
Each of the six different NDS® Equine collagen peptides is designed for a specific job in the body. All are well-documented and effective.

Studies have shown that specific collagen peptides are necessary, particularly to prevent overload and injury in high performance horses – including improving recovery and providing more effective treatment where damage has occurred.

Injuries in horses are often work-related

Research and experience show that horses most often become overloaded/develop injuries depending on the training work that they perform. *This is summarised in the table.*

	Dressage	Jumping	Driving/trotting
Training injury type	Suspensory ligament Support ligament of the deep flexor tendon Deep flexor tendon	Support ligament of the deep flexor tendon	Superficial flexor tendon Suspensory ligament branches
Inflammation and age-related	Wear and tear and twists with associated new growth (osteoarthritis, OA) in all joint surfaces, e.g. hoof joint, fetlock joint, stifle, hocks, neck and spine		
Paddock injuries	Kick injuries to muscles, joint capsules, ligaments and articular cartilage		



Articular cartilage, inflammation and prevention/healing of wear and tear

NDS® Equine Ezy Move® is a unique, specially designed collagen peptide for preventing wear to joint cartilage.

Damage to cartilage and joints can lead to osteoarthritis, with thinning of the cartilage and painful new growth (OA) in horses of all ages. This type of damage accounts for more than 60% of cases of lameness in horses. The joint cartilage contains up to 70% collagen.

NDS® Equine Ezy Move® is made up of collagen peptides, which in studies have been shown to provide significant support to the maintenance and rebuilding of cartilage.

This makes **NDS® Equine Ezy Move®** a unique and very effective collagen peptide supplement.

NDS® Equine Ezy Move®

- Reduces the progressive loss of cartilage
- Boosts joint health in a natural physiological manner and is incorporated into joint cartilage
- Stimulates the production of joint cartilage, hyaline, shock-absorbing cartilage
- Provides better mobility and movement
- Healthy joint cartilage provides better mobility and less pain

For best results, it is recommended that collagen supplements should be given daily.

NDS® Equine Ezy Move® helps to stimulate cartilage-forming cells (chondrocytes) to increase their production of new cartilage matrix, as well as reducing inflammation. Cartilage matrix consists predominantly of collagen and proteoglycans, which act as a buffer between the bones.

Recommended daily dose: 25 g–50 g

	 NDS® Equine Multi Collagen Total®	 NDS® Equine Ezy Move®	 NDS® Equine MuscleX®
Product No.:	5016	5017	5014
Contents:	100 % tissue-specific collagen peptides that support joints and cartilage, tendons and ligaments, and muscles.	100 % tissue-specific collagen peptides that support joints and cartilage with a view to reducing wear and preserving strength.	100 % tissue-specific collagen peptides that support muscle function and fat burning.
Effect:	Articular cartilage, Ligaments, tendons Muscles General maintenance during demanding exercise and tissue injury healing.	Supports the formation of new cartilage mass Reduces the progressive loss of cartilage Boosts joint health in a natural physiological manner Provides better mobility and movement, less pain	Increases muscle mass Converts fat into muscle during physical activity Improves the ratio between fat and muscle Maintains strong and healthy muscles Supports healing of tissue damage Used during rehabilitation Increases the loss of adipose tissue more than exercise alone can do.
Dose:	Horse: 75 g Pony: 37.5 g In 1/3–1/2 doses can be mixed with the specific collagen peptides.	Horse: 1 measuring spoon (50 ml) = 25 g Pony: 1/2 measuring spoon (25 ml) = 12.5 g The dose may be doubled in the case of recovery from inj	
All:	**Approved at a laboratory recognised by the FEI.** No fillers, no allergens, no chemical ingredients, no synthetic ingredients, no sugars, r		

		
NDS® Equine TendonX®	**NDS® Equine BoneX®**	**NDS® Equine HoofX®**
5015	5013	5018
100 % tissue-specific collagen peptides that support tendons and ligaments for optimal strength, elasticity and recovery.	100 % tissue-specific collagen peptides that support and heal the bone structure, both preventively and during the healing of injuries.	100 % tissue-specific collagen peptides that support skin and hoof recovery
Increases ligament and tendon strength Improves mobility Reduces the risk of injury Improves healing after injury.	General maintenance of bone tissue during demanding exercise and tissue injury healing, e.g. from microfractures. Prevention of microfractures in young horses.	Supports the formation of new hoof tissue, e.g. following hoof injury or disease. Can also be used for skin injuries that need to heal, e.g. following surgery, large wounds and irritation.
ury, 3–6 months.	Preventive: 1 measuring spoon (50 ml) = 25 grams Injury healing: 2 measuring spoons (50 ml) = 50 grams (pony: half dose)	
no colourings or flavourings. 100% neutral taste.		

Tendons and ligaments

NDS® Equine TendonX® supports the maintenance of strong, flexible ligaments and tendons.

Ligaments and tendons are the connections between bones and between bones and muscles. It is important, therefore, to have healthy, strong ligaments and tendons. Age, wear and tear, training and the demands of competition can reduce their strength and flexibility and increase the risk of damage.

Tendon damage is often caused by repeated minor injuries/overload, which the horse does not notice until there is more significant tissue damage to the tendon.

Healing times for tendon injuries are long, as tendons have a poor blood supply and healing is therefore a difficult affair, one that requires a long and targeted effort with the correct feed, collagen peptide supplementation and systematic rehabilitation.
It is the combined strength and flexibility of tendons and ligaments that determines whether or not damage occurs. Healthy collagen fibres provide the right elasticity, combined with strength, when the horse is doing that bit extra.

The type of particularly active collagen peptides found in **NDS® Equine TendonX®** are designed to enhance the health and biological quality of ligaments and tendons.

Studies have demonstrated a very positive effect when **NDS® Equine TendonX®** is used together with targeted physical activity. The risk of damage is dramatically reduced, and an improvement in flexibility and shortening of recovery time can be observed.

NDS® Equine TendonX®

- Strengthens tendons and ligaments
- Improves mobility
- Reduces the risk of injury

Recommended daily dose: 25 g–50 g

Muscles and fat burning for maximum performance

NDS® Equine MuscleX®

NDS® Equine MuscleX® is an effective and well-documented collagen peptide that, together with physical exercise, significantly strengthens and builds up muscles.

Collagen is one of the most important nutrients for maintaining or increasing muscle mass and muscle function.

NDS® Equine MuscleX® has been shown in studies to convert up to 12% of fat into muscle mass in conjunction with physical activity.

The amino acids in **NDS® Equine MuscleX®** support the healing of tissue damage.

NDS® Equine MuscleX®

- Increases muscle mass
- Converts fat into muscle during physical activity
- Improves the ratio between fat and muscle
- Maintains muscle health and strength
- Supports healing of tissue damage
- Used during rehabilitation
- Increases the loss of adipose tissue more than exercise alone can do

Collagen in this form is an important nutrient for maintaining, building and increasing the efficiency of muscle mass for optimal performance.

Recommended daily dose: 25 g–50 g

NDS® Equine Multi Collagen Total®

Optimised maintenance of the whole horse

NDS® Equine Multi Collagen Total® is an effective and unique supplement of three different collagen peptides.

The only multi-collagen product for horses on the market, **NDS® Equine Multi Collagen Total®** is a unique, effective and well-documented supplement containing three different collagen peptides, thus providing support in all areas.

- Articular cartilage
- Ligaments, tendons
- Muscles

It is targeted towards both daily maintenance and restoration following damage.

Painkillers, whether steroidal or non-steroidal, are anti-inflammatory in the short term, but over the longer term they inhibit the normal building of connective tissue and can weaken tendons and ligaments.

Injuries, wear and tear on joints, cartilage, ligaments, tendons and muscles are a real issue for horses in all forms of activity and all ages. This applies equally to leisure horses, senior horses and performance horses.

Gastric ulcers are very common in horses, and collagen peptide supplements can reduce inflammation and assist healing by summoning repair cells (fibroblasts) to heal the mucous membrane.

We have created a product that offers your horse more than just one type of collagen in order to support and optimise mobility in several areas.

Recommended daily dose: 37.5 g–75 g

Bones, connective tissue and prevention/healing of microfractures

NDS® Equine BoneX® is a unique, specially developed collagen peptide for incorporation into bone tissue, thereby supporting the microarchitecture and allowing mineralisation to take place in the normal way.

Horses have more than 200 bones, and as in other mammals there are two kinds of bone tissue that are present in different ratios, depending on whether the bone needs to be very strong and weight-bearing, such as the tubular bones of the legs, or more enveloping and protective, such as in the spine and thorax.

In adult horses, complete fractures of the long tubular bones are generally impossible to heal. This is because the horse is so heavy, the movement pattern is complex and it is very difficult to achieve stability during a long healing phase.

Fractures heal better in foals, because they are softer, lighter, in the process of growing and heal quickly.

Attempts can be made to stabilise and heal partial fractures using splints and screws during surgery, which requires the connective tissue in the bones to "bind the tissue together" across the fracture line, after which mineralisation can occur and the bone can regain its strength.

The basic substance in bone is an organic, living skeleton of connective tissue consisting of 20% collagen (in addition to carbohydrates and other proteins) and approx. 10% water, and the inorganic minerals are pasted into this skeleton and constitute around 70%. Once in the bone, these bone minerals are predominantly calcium, but a number of other minerals

and vitamins are necessary in order for the process to progress to best effect. The macrominerals are: calcium, phosphorus, magnesium, sodium, potassium and sulphur. The trace elements are zinc, silicon, iron, copper, manganese and selenium. The absorption and binding of these minerals in the bones is entirely dependent on vitamin D3 and the K vitamins. The horse obtains vitamin K1 from grass, and K1 is converted into active vitamin K2 by beneficial microbiota in the gut.

Collagen for connective tissue in the bones

The organic fifth of the horse's bones consists of approximately 93% collagen, 5% protein, 1% proteoglycans and 1% citrate. Collagen peptides are broken down pieces of protein chains and amino acid chains. In collagen, approximately 1/3 of the amino acids are glycine combined with other amino acids, such as proline, hydroxyproline, arginine and lysine. The protein chains of **NDS® Equine BoneX®** are specifically hydrolysed so that the peptides are suitable for incorporation into the connective tissue of the bones. There are, for example, various amino acid compounds found in the collagens of the skin, joints and gut.

Bone mass in horses

The ratio between muscle and bone various throughout the horse's life. Depending on the breed, foals typically have 32–36% of their birth weight as muscle and 12–22% as bone. As they grow, this changes to 44–53% muscle and 11–13% bone.

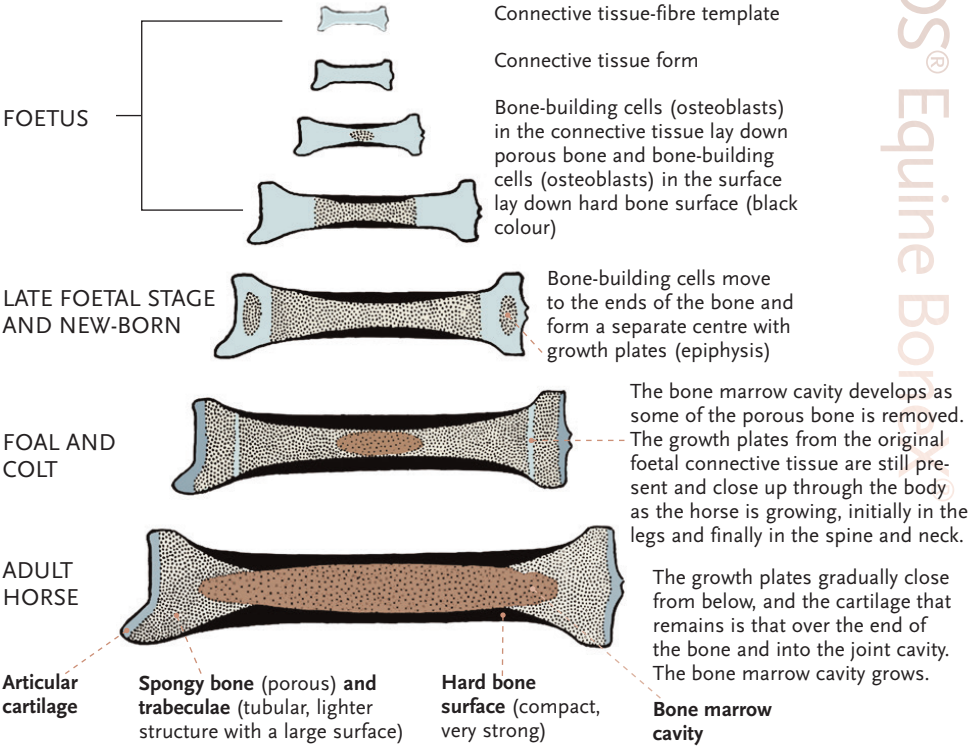
For a horse weighing 500 kg, this is equivalent to approx. 60 kg of bone, of which the connective tissue in the bones accounts for 12 kg.

Thoroughbreds have a relatively higher muscle mass than other horses (53%), as well as faster muscle mass growth as they grow. The ratio of muscle to bone in thoroughbreds is approx. 4.2 times more muscle mass than bone mass, while the ratio in other horses is approx. 3.9. It is thought that the large muscle mass relative to the bones and relatively immature bones in young horses – as well as very early race training – explains the occurrence of bone problems in the form of (micro)fractures and what are termed "bone bruises", which are particularly seen in racehorses and jumping horses.

Horses do not develop osteoporosis in the same way as do humans, and there are no sex differences in bone mass between mares and geldings throughout their lives, although the tubular structure in the porous bone weakens with age, as it does in humans.

Figure 1. The development of the horse's bones from foetus to adult.

Adapted from Deb Bennett, American Farriers Journal, December 2019



Bone bruises, bone oedema

This is a relatively new diagnosis that has come into being with the availability of magnetic resonance imaging (MRI) in horses. The damage cannot be seen on X-rays and consists of fluid accumulation, oedema and microfractures of the porous bone beneath the articular cartilage, i.e. close to the end-piece of the bones. This part of the bone lies between the calcified joint surface and the softer bone that lies next to the bone marrow, and its function is to act as a template for the joint itself.

This part of the bone is particularly sensitive to mechanical stress, which with repeated impact rises through the joint from below and the more solid bone of the leg (which is moved by muscles, tendons and ligaments).

This type of damage arises if this part of the bone is unable to adjust to the stress of training (because the training is too ambitious for the horse's age, biology and feeding with the relevant proteins, vitamins and minerals). An increased fluid signal is seen on the MRI scan, indicating the presence of a lesion in this bone tissue and a change in bone metabolism compared with normal bone tissue at the end of a long tubular bone, close to the joint.

Treatment will typically consist of 3–4 months' rest, with controlled exercise on a varied surface. Swimming exercise and, if necessary, anti-inflammatory measures (medication, feed) and measures to improve blood circulation in the bone are fine.

NDS® Equine BoneX® helps to stimulate bone-building cells (osteoblasts) to form new bone matrix and reduce inflammation. Bone matrix consists predominantly of collagen and proteoglycans and forms the actual skeleton to which the bone minerals attach.

- General maintenance of bone tissue during demanding training and tissue injury healing, e.g. microfractures and bone bruises.
- Prevention of microfractures in young horses in training.
- Prevention of age-related loss of the tubular structure of the porous bone in horses in (demanding) sport.

The feed should contain all the nutrients of relevance to bones in balanced ratios so that the horse has the biological reserves to heal the injury. Roughage should be analysed and a regular feeding plan initiated that includes generous levels of macro and micronutrients.

Rehabilitation following the healing period must also be adjusted, while future training must be varied, biomechanically correct and with suitable periods of recovery time. Repetitive, monotonous work and exhaustion are a significant factor in the onset of this kind of damage.

Recommended daily dose:
Preventive: 1 measuring spoon (50 ml) = 25 grams
Injury healing: 2 measuring spoons (50 ml) = 50 grams
(pony: half dose)

Strong hooves and formation of new hoof tissue

"No foot, no horse"

A horse's hooves are the fundamental basis for the horse's ability to move, perform (training-related) work and thrive. Hoof growth depends on sufficient feed without too much sugar/starch and with adequate protein, as the sulphur compounds necessary for strong hoof walls and skin keratin are formed only from sulphur-containing amino acids and not from "extra sulphur" as a supplement. Minerals and micronutrients are discussed under **NDS® Equine HoofX®**, and a feeding plan is strongly recommended if the horse has lasting, stubborn hoof problems.

NDS® Equine HoofX® consists of 100% tissue-specific collagen peptides that support the recovery of the skin and hooves.

Supports the formation of new hoof tissue, e.g. following hoof injury or disease. Can also be used for skin injuries that need to heal, e.g. following surgery, large wounds and irritation.

- Loss of hoof tissue following large hoof abscesses/injuries/other conditions that jeopardise the stability of the hoof
- Healing of conditions that have weakened the connection of the lamellae to the hoof capsule, e.g. laminitis
- Healing of white line disease during and after treating the infection itself
- General strengthening of "problem hooves" if the correct feeding plan is not sufficient

Recommended daily dose:
Preventive: 1 measuring spoon (50 ml) = 25 grams
Injury healing: 2 measuring spoons (50 ml), = 50 grams (pony: half dose)

NDS EQUINE NUTRITION APS is a leader in the field of effective and documented collagen products for horses.

For injuries, it is easy to use the more specific NDS Equine Collagen Peptide products:

Equine Ezy Move® for joints and cartilage.

Equine TendonX® for tendons and ligaments.

Equine MuscleX® for muscles.

Equine BoneX® for bones.

Equine HoofX® for hooves and skin.

If you use these supplements alone, the daily dose is 50 g, and the half dose 25 g if used together with a daily dose of **NDS® Equine Multi Collagen Total®**. For collagen to be effective, it is important to get the correct high daily dose.

It is about supplying the right collagen peptide to the right place – irrespective of where the need has arisen

It is all about biology

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