Everything you should know about Collagen and PEMF

Collagen is the body's most prevalent protein. Collagen is a type of protein found in the body. It gets its name from the Greek word "kólla," which meaning "glue." Collagen is responsible for the cohesiveness of tissues and organs in our bodies. It also has features of hydration, resistance, and flexibility.

It is utilized to build connective tissue because of its fiber-like structure. This type of tissue joins other tissues, as the name implies, and is a major component of bone, skin, muscles, tendons, and cartilage. It aids in the development of strong and resilient tissues that can endure stretching.

Collagen makes up approximately one third of the total protein in the human body, which is more than any other type of protein in the body. Collagen is only found naturally in animal flesh, such as meat and fish, which include connective tissue. However, resources for collagen formation in our bodies can be found in a variety of animal and plant meals.

As we age, our bodies produce less collagen, but excessive sun exposure, smoking, excessive alcohol, and a lack of sleep and exercise cause collagen production to drop more quickly.

Collagen in the deep skin layers degrades from a well-organized network of fibers to a disorganized maze as people age. Exposure to the elements damages collagen fibers, diminishing their thickness and strength, resulting in wrinkles on the skin's surface.

Biological Functions Of Collagen

Connective tissue, skin, tendons, bones, and cartilage all contain collagen. It supports tissues structurally and is involved in a variety of biological functions, including:

- Tissue regeneration
- Protective reaction of the immune system
- Connection between cells
- The process of cellular migration is required for tissue upkeep.

What Is The Process Of Collagen Production?

Collagen is a polypeptide or protein. As a result, it is made up of a chain of amino acids linked by peptide bonds. Amino acids are biological components that are used all over the body. They are either naturally made by the body or must be obtained through our food.

Collagen is made by a variety of cells, including fibroblasts, which are specialized cells. These are found in our body's connective tissues, which serve a critical role. Fibroblasts help to organize amino acids into polypeptides, which are then used to form collagen.

What Are Connective Tissues?

Collagen is the main component of connective tissues, which can be found all over the body. Their job is to connect and sustain the rest of our body's tissues, particularly our organs. They conduct filling, attaching, insulation, and protection in addition to their support role. Many structures, including tendons, cartilage, bones, blood vessels, muscles, and organs including the eyes and skin, include it. Eighty percent of the human body is made up of connective tissues.

What Is The Origin Of Collagen?

By breaking down dietary protein into amino acids, the body produces its own collagen. Amino acids are responsible for the formation of many types of protein in the body, including collagen.

What Are The Types Of Collagen?

There are around 28 different kinds of collagen in the human body. Types I through V account for 99 percent of all collagen in the human body. Differebt types of collagen is used to create and present in the following structures in the body:

Type I:

Type I is approximately 90% of the total collagen in the body and they are present in the following:

- Bones
- Tendons
- Ligaments
- Skin
- various internal organs

Type II

- Cartilage
- Ocular (eye) structures

Type III:

- Muscle
- blood vessel walls
- Bone marrow
- Lymphoid tissues.

Type IV

The majority of internal organs are classified as Type IV. They are found in the basement membrane as thin sheets of collagen, surrounding most types of organ tissues.

Type V:

Type V comprises the majority of connective (supporting) tissues and is frequently coupled with Type I and found on the cell surface and the hair.

Collagen Production And The Effects Of Aging And The Environment

Many metabolic pathways are directly impacted by aging and our lifestyle. Our bodies' ability to generate new proteins, particularly collagen, is one example. When the body is unable to generate new proteins, it is critical that the body compensates for the intake of necessary amino acids through food.

Other factors, such as aging, might increase the body's need for amino acids in order to produce new proteins, such as collagen. Stress, trauma, and certain aging-related

degenerative diseases are among these variables. Other sources of oxidative stress in our bodies include smoking, exposure to UV rays from the sun, all of which may have an impact on amino acid requirements and cause collagen depletion.

A diet high in added sugar and ultra-processed foods can also contribute to premature aging by contributing to a process known as glycation, which slows collagen turnover and interferes with collagen's capacity to interact with surrounding cells and proteins, resulting in premature aging.

What Happens When Collagen Production Decreases In The Body?

Collagen production is thought to decline by roughly 1% every year starting at the age of 30, with the percentage increasing as one approaches 50. This can result in a loss in function in collagen-rich tissues, as evidenced by the following symptoms:

- Muscle and joint stiffness
- Appearance of wrinkles and fine lines
- muscular tone deficiency
- Aches in the body
- Wounds heal more slowly.
- More tired than usual

Ironically, most of us endure these minor annoyances because we do not have any serious health issues or pain in our early thirties.

However, when it comes to the loss of collagen in our bodies, these issues are simply the tip of the iceberg; when combined with aging, they have a direct impact on our health and quality of life.

How Do You Maintain Or Increase Collagen In The Body?

According to medical experts, a balanced diet of protein-rich foods (chicken, beef, eggs, dairy, legumes, nuts, and whole grains, for example) and a variety of fresh vegetables provides the particular building blocks for collagen.

A diet rich in fresh fruits and vegetables also provides antioxidants, which protect the body from oxidative stress. Oxidative stress can destroy collagen. The body's ability to

generate collagen naturally declines as we age, but that excessive sun exposure, smoking, and a poor diet can further stifle collagen production.

Collagen loss can be slowed down or prevented by the following measures:

- Eating a protein rich diet
- Plenty of fresh fruits and vegetables
- Eating Vitamin C rich foods
- Using sunscreen all over exposed areas of the body to protect from UV rays
- Avoiding excessive sun exposure
- Avoiding excessive smoking
- Avoiding excessive alcohol
- Stress management and adequate sleep/ rest

Foods That Are Rich In Collagen or Increase Collagen Production

Collagen is found in foods that include gelatin, such as bone broth. After collagen has been cooked, gelatin is a protein compound. Collagen is found in animal connective tissues, hence, present in meat. Vitamin C is required for collagen formation, hence foods high in this vitamin and vitamin C supplements are beneficial in collagen production in the body.

More research is needed to see if eating collagen-rich foods can help you improve your collagen levels. Collagen can be found in the following foods:

- Chicken
- Fish
- Whites of eggs
- Fruits of the citrus family
- Berries
- Vegetables that are red and yellow
- Garlic
- White tea
- Green, leafy vegetables
- Cashews
- Tomatoes
- peppers (bell)
- Beans
- Avocados
- Soy
- Collagen-rich herbs (Chinese knotweed, horsetail, gynostemma)

- Herbs that aid in the production of collagen (gotukola, bala, ashwagandha)

The Truth About Collagen Supplements

Collagen is a common element in oral supplements and topical lotions, but there is little scientific evidence to back up its effectiveness. Several collagen supplements claim to improve skin health, relieve joint pain, prevent bone loss, build muscle mass, support heart health, improve hair and nail strength, improve gut and brain health, and aid weight loss.

There is little, if any, documented proof that taking these supplements has any genuine medical benefit for hair, nails, or skin. Experts believe there are more effective strategies to maintain healthy body, joints, hair and skin. It is advised to be cautious of the health claims regarding supplementary collagen as all of these alleged benefits have not been thoroughly investigated by science.

Furthermore, that the US Food and Drug Administration (FDA) does not oversee collagen supplements with the same rigor as it does medicines. This implies that collagen supplement makers are not required to establish that their products are beneficial or safe before putting them on the market.

Vitamins from food, unlike supplements, are connected to a longer life span. Many supplements contain highly processed collagen (which is derived from animal sources such as cow bones or fish skin). This breaks down collagen into peptides, which are short sequences of amino acids, destroying its structure. Hydrolyzed collagen is the final product, which is water-soluble and thus easier to mix into a lotion or dry and put into a tablet.

When deciding whether or not to take a collagen supplement, take into account how your diet and lifestyle effect your body's collagen production. Adding a vitamin to an unhealthy diet and lifestyle will not improve your health. It is advised to consult a medical professional before taking collagen supplements and instead of pills, focus on healthy lifestyle factors and a well-balanced diet can have a better effect on long-term health.

Collagen in Medicine

Arthritis causes the collagen in joints to break down faster than it can be replaced, resulting in joint discomfort and mobility loss. Scientists have been experimenting with

delivering collagen for treating arthritis since the 1980s. But this strategy hasn't always worked.

In a small number of research trials, collagen supplements were proven to aid individuals with osteoarthritis, however collagen does not appear to be more effective than the top medicine for treating rheumatoid arthritis.

Oral collagen supplements helped individuals with osteoarthritis decrease pain, according to a 2017 study published in the Journal of Arthritis, but collagen wasn't more successful than the current leading prescription treatment for rheumatoid arthritis. Collagen supplements were also reported to aid people with osteoarthritis alleviate pain in a 2016 study published in Nutrition Journal.

According to the Arthritis Foundation, collagen is unlikely to begin regrowing itself to entirely reverse arthritis, even if a person takes oral supplements. According to a 2018 study published in the journal PLOS One, surgically injecting collagen into arthritic joints could be a viable treatment for arthritis.

According to a study published in the journal BioMedical Engineering OnLine, collagen is more effective at mending wounds and has been used to do so for over 2,000 years. Collagen is given topically to aid healing and prevent infection, frequently in combination with other structural proteins and antibiotics.

A 2014 article in the journal Biopolymers, for example, describes how a collagen sponge or gel can be used to cover a serious burn. The sponge keeps the skin wet while also protecting it from infections, and the collagen serves as a scaffold for cell regeneration and the development of new collagen.

The effects of collagen supplements on aging skin were studied by giving subjects oral collagen supplements for eight weeks. Collagen supplementation enhanced both skin density and moisture, according to the study's findings, which were published in the Journal of Cosmetic Dermatology in 2015.

Collagen supplementation may aid with hair regrowth and reversing hair loss, according to a 2015 study published in The Journal of Investigative Dermatology.

In one study, participants were given a collagen supplement every day for 24 weeks and the results were published in the Journal of Cosmetic Dermatology in 2017. Collagen supplements increased nail growth by 12% and reduced the incidence of broken nails by 42%, according to the researchers.

With regards to skin health and ageing of skin, doctors recommend that daily usage of retinoids, retinol, ceramides, or salicylic acid (depending on a person's needs) sunscreen,

moisturizer and other treatments is a more effective strategy to maintain skin healthy, since there isn't enough research to confirm if collagen supplements help.

Collagen and PEMF (Pulsed Electro-Magnetic Field therapy)

Magnetic energy is sent into the body through pulsed PEMF therapy. These energy waves aid healing by interacting with your body's natural magnetic field. The magnetic fields aid in the production of electrolytes and ions.

This has a natural effect on cellular electrical changes, as well as cellular metabolism. It helps reduce chronic pain by assisting your body's natural recovery processes. Best of all, it's completely risk-free.

Pulsed Electro Magnetic Fields (PEMFs) have long been utilized for a variety of therapeutic purposes, including bone growth, wound healing, depression, nerve and muscle pain alleviation, and musculoskeletal tissue regeneration (i.e., cartilage, tendons, and ligaments).

While PEMF therapy was popular in the 1950s, the United States Food and Drug Administration (**FDA) only granted approval for its use for bone development in 1979.**

Finally, electricity is required by the human body to send signals throughout the body and to the brain. The electricity in your cells can be efficiently realigned with PEMF therapy. When a cell is activated, an open ION channel permits positive charges to enter the cell.

The inside of this cell gets positively charged, causing other electrical currents to be triggered, resulting in pulses. This can have a favorable impact on movement, healing, and signal transmission. Any interruption in electrical currents might result in sickness or dysfunction.

Pulsed PEMF therapy helps to restore the normal condition of electrical current, which promotes general wellness.

- PEMF **increases collagen fibre deposition and myofibroblast population** in the early phase of diabetic wound healing. The increase in collagen fibre deposition in early diabetic wound could be due to enhancement of myofibroblast proliferation.

- PEMF improved the regeneration of the cartilage defect sites on sheep model in studies which demonstrated that PEMF has beneficial effects on **cartilage regeneration**.

- PEMFs have also been shown to considerably **increase bone mineral density** and promote osteogenesis in various clinical investigations.

- The use of **PEMF for arthritis** treatment has decisively proven that PEMF not only relieves pain in arthritis patients, but it also provides chondroprotection, has anti-inflammatory properties, and aids in bone remodeling, suggesting that it might be developed as a viable arthritis treatment option.

Non-invasive aesthetic treatments with PEMF:

PEMF's impact on the formation of collagen and fibroblasts make it perfect for medical aesthetics treatments. It can be used for non-invasive cellulite reduction, body contouring, and skin tightening alone or in combination with other treatments to achieve ideal outcomes.

PEMF typically uses a coil positioned over the intended treatment area to deliver fast pulses of electricity, creating magnetic fields through the skin that change the electrical charge of dermal cells. This causes an increase in collagen formation by dermal fibroblasts, as well as angiogenesis stimulation for healthy cell renewal.

This results in smoother, firmer, healthier-looking skin, enhances neovascularity, fibroblast proliferation, collagen production, and elastin fiber contraction.

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