

Carnosine, Still the Best for Anti-Aging

Sometimes people seem obsessed with finding the "next" best thing and forget the tried and true. When it comes to supplements, this translates as chasing down the next açai berry, while abandoning the "older" supplements that really work. This is not hypothetical, but can easily be tracked in the sales of different supplements and in the questions that companies receive, such as: "Why aren't you using ingredient X in your antioxidant formula?" In the world of natural anti-aging solutions, carnosine is one such ingredient. It was almost 10 years ago that I first started playing with carnosine as an "anti-aging" ingredient and incorporating it in formulas. At that time, the ingredient was almost unknown in the U.S. and Europe, with almost all the research being done in Russia and Australia. Pretty much the only major people incorporating it in formulas at that time were myself and the Life Extension Foundation.



Within a couple of years, however, carnosine was appearing everywhere: in supplements, eye drops, and skin creams -- all promoting its anti-aging benefits. And for a while, people bought lots of it. But then three things happened.

1. Much of the carnosine being used was very low grade -- pure crap, to put it in technical terms. It wasn't very effective. The good stuff cost substantially more and was harder to get. That meant that the "carnosine" products from a lot of companies simply didn't do anything.
2. It was an expensive ingredient when it first came out so much of it was used at pixie dust levels, purely as label dressing -- so companies could claim they had it in their products. Unfortunately, that meant it had virtually no effect, and people eventually stopped buying these products. This severely tarnished carnosine's reputation as an effective anti-aging ingredient. The problem is that carnosine's effectiveness doesn't just build gradually. If you don't take enough of it during the day, it simply has no effect. The reason is that carnosine is readily degraded by the enzyme carnosinase in the human body. You need to take enough to overwhelm the carnosinase so that "undegraded" carnosine can make its way to the cells of your body. The amount varies according to age and diet, but in general, for people in their mid-thirties and higher, you're looking at 1000-1500 mg a day. If you're younger, healthy, and include lots of meat in your diet, 500 mg a day is probably enough. But less than that, and you might as well be taking sugar pills.
3. And as it turns out, people have short memories. Other anti-aging solutions began to appear in the news -- ingredients such as growth hormone and resveratrol that pushed carnosine out of the news. At that point, no one was looking for carnosine products for anti-aging. That was "old fashioned," like Carter's Little Liver Pills. They were looking for resveratrol and açai berry. And suddenly you had resveratrol and açai supplements and skin care products flooding the

market. Carnosine was nowhere to be found. (Incidentally, I have nothing against either resveratrol or açai. I was using resveratrol in my antioxidant formulas back in 1999, years before it became "hot." As for açai, I introduced it to the Health Sciences Institute for a feature story in 2003, long before Dr. Perricone promoted it on Oprah.)

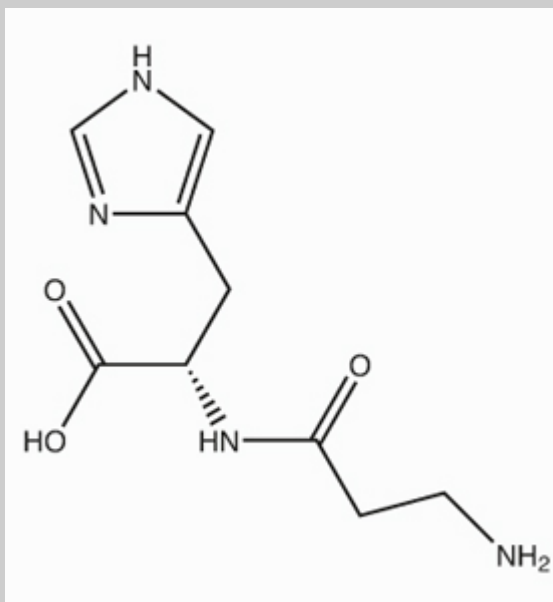
And that's where things stood with carnosine until Dr. Oz "discovered" it last year (about ten years behind the curve) and made it "hot" once again -- at least for awhile. Unfortunately, because the quality of much of the carnosine out there is still suspect and because many companies are still using it as label dressing, it once again failed to produce as advertised and once again faded from the news. And that's a shame!

Why?

Because, even though it's "yesterday's news" and no longer trendy, carnosine, when used properly, is one of the most effective and fast acting natural anti-aging options available -- and that's being confirmed and validated in study after study. And quite simply, there is probably no other supplement you can easily take without a doctor monitoring you, that will produce a faster change in your appearance!

With that in mind, let's take a fresh look at carnosine -- what we knew ten years ago when I first wrote about it and used it in formulas, and what we now know as the result of the most recent studies.

Carnosine 10 years ago



L-carnosine (AKA carnosine), a naturally occurring combination of two amino acids, was discovered in Russia in the early 1900s. Because much of the pioneering research was done in Russia, it was largely unavailable to the rest of the world until a number of studies and experiments in other parts of the world began verifying those studies -- and more.

Most notably, there were a series of astonishing experiments done in Australia that proved that carnosine rejuvenates cells as they approach senescence (the stage just before death where a cell is still alive, but essentially non-functional). The studies showed that cells cultured with carnosine lived longer and retained their youthful appearance and growth patterns.

What's probably the most exciting result of the studies is that it was discovered that carnosine can actually **reverse** the signs of aging in senescent cells.

How to Reverse Aging in Cells

In one study, when scientists transferred senescent cells to a culture medium containing carnosine, those cells exhibited a rejuvenated appearance and often an enhanced capacity to divide 1,2 When they transferred the cells back to a medium lacking carnosine, the signs of senescence quickly reappeared.

As they switched the cells back and forth several times between the culture media, they consistently observed that the carnosine medium restored the juvenile cell phenotype **within days**, whereas the standard culture medium brought back the senescent cell phenotype. In addition, the carnosine medium increased cell life span -- even for old cells. When the researchers took old cells that had already gone through 55 divisions and transferred them to the carnosine medium, they survived up to 70 divisions, compared to only 57 to 61 divisions for the cells that were not transferred.

This represents an increase in the number of cell divisions for each cell of almost 25%.

But in terms of cell life, the increase was an astounding 300%. The cells transferred to the carnosine medium attained a life span of 413 days, compared to just 126 to 139 days for the control cells.

Increase Life Expectancy

A Russian study on mice subsequently showed that mice given carnosine are twice as likely to reach their maximum lifespan as untreated mice.[3,4](#) Carnosine also significantly reduces the outward "signs of old age."

In effect, it makes the mice look younger. 44% of the carnosine treated mice had young, glossy coats in old age as opposed to only 5% in the untreated mice. This represents 900% better odds of looking young in old age.

Another important difference between the treated and the untreated mice was in their behavior. Only 9% of the untreated mice behaved youthfully in old age, versus 58% of the carnosine treated mice. That's a 600% improvement in how they felt.

Protein Glycation: Sugar and Aging



Glycation is the uncontrolled reaction of sugars with proteins. It's kind of like what happens to sugars when you heat them and they caramelize. In effect, glycation is what happens when excess sugars and/or alcohols caramelize the proteins in your body. It's a major factor in the aging process -- and it's particularly devastating to diabetics.

Your body is mostly made up of proteins. In fact, proteins are the substances most responsible for the daily functioning of your body. That's why anything that causes protein deterioration has such a dramatic impact on the body's function and appearance.

Thanks largely to the destructive effect of sugar and aldehydes (compounds formed by the oxidation of alcohol), the protein in our bodies tends to undergo destructive changes as we age. This destruction is a prime factor, not only in the aging process itself, but also in the familiar signs of aging such as wrinkling skin, cataracts, and the destruction of our nervous system -- particularly our brains. Studies show that carnosine is effective against all these forms of protein modification.

Protein Modification for Longevity

As I said, aging is associated with damage to cellular proteins. But carnosine protects cellular proteins from damage in at least two ways.

1. Carnosine bonds with the carbonyl (or aldehyde) groups that if left alone will attack and bind with proteins.[5,6](#)
2. It works as an antioxidant to prevent the formation of oxidized sugars, also called Advanced Glycosylation End-products or AGEs for short. That's really the caramelization thing that I mentioned earlier. The bottom line here is that the less AGEs, in your body, the younger you are.[7,8](#)

Both of these processes have important implications for anti-aging therapy. The key is that carnosine not only prevents damaging cross-links from forming, it eliminates cross-links that have previously formed in proteins, thus restoring normal membrane function in cells.

Preventing Alzheimer's

Carnosine has been proven to reduce or completely prevent cell damage caused by beta-amyloid (AKA amyloid-beta, amyloid β -protein, and A β), one of the prime suspected protein risk factors for Alzheimer's. The presence of beta-amyloid leads to damage of the nerves and arteries of the brain. Carnosine blocks and inactivates beta-amyloid.[9](#) In effect, it protects neural tissues against dementia. The key is that carnosine not only prevents damaging cross-links from forming in proteins, it eliminates cross-links that

have previously formed in those proteins, thus restoring normal membrane function in cells. This is true not only in the brain, but in all the organs of our body -- our skin included. Keep in mind that the damage you see in the skin is not just a cosmetic question. That damage is absolutely an indicator of the kinds of damage happening to every other organ in your body -- including your eyes and your brain.

It should be noted that although still "unproven," the beta-amyloid connection to Alzheimer's is nevertheless the dominant theory as to its primary cause. The mainstay of the amyloid β -protein hypothesis of Alzheimer's disease is that a gradual and chronic imbalance in the production versus the clearance of A β leads to a slow rise in its steady state levels in brain tissue. This leads to beta-amyloid plaque accumulation and subsequently, to the complex molecular and cellular changes associated with the disease.¹⁰ Thus anything that helps inhibit excess beta-amyloid accumulation in the brain -- or even better, helps remove it -- is likely to be Alzheimer's protective.

Auto-Regulator

Carnosine has the remarkable ability to throttle down bodily processes that are in a state of excess, and to ramp up those that are under expressed. For example, carnosine thins the blood of people whose blood tends to clot too much and increases the clotting tendency in those with a low clotting index.¹¹

Another example is that carnosine suppresses excess immune responses in those who have "hyper" immune systems, whereas it stimulates the immune response in those with weakened immune systems -- such as the aged.¹² This is a critical benefit for people with allergies and people with autoimmune disorders.

And, as a neurotransmitter, carnosine even seems to have the ability to normalize brain wave functions.¹³ In fact, studies indicate that carnosine might play an invaluable role in helping to prevent and control seizures.¹⁴

Carnosine -- the New Studies

And that's where things stood when I first wrote about carnosine ten years ago. Since then, the evidence of carnosine's benefits has continued to pour in. For example, a 2010 study published in *Rejuvenation Research* found that adding carnosine to the diet of fruit flies produced a 20% increase in the average life span of male flies.¹⁵ Curiously, it had no effect on the lifespan of female flies -- until water-soluble vitamin E was also added. At that point, female flies experienced an immediate 36% increase in longevity. Although fruit flies are not human beings, this study confirms observations already seen in human subjects. Note: the reason for using fruit flies as test subjects is that their short lifespan allows for quick observation on whether a nutrient increases lifespan or not. By itself, this study may not mean a lot, but when analyzed in the context of the following studies, it's extremely powerful.

Carnosine helps control blood glucose



A recent study found that there is evidence that the release of carnosine from skeletal muscle during physical exercise affects autonomic neurotransmission and physiological functions. In particular, carnosine positively impacts the activity of sympathetic and parasympathetic nerves that supply energy to the adrenal glands, liver, kidney, pancreas, stomach, and white and brown fat tissues, thereby causing beneficial changes in blood pressure, blood glucose, appetite, lipolysis, and the thermogenic burning of fat.¹⁶ In summary, carnosine lowers elevated blood sugar levels, improves insulin production and sensitivity, and promotes the loss of weight and body fat. And if this were not enough, studies have shown that people who are diabetic or even pre-diabetic have lower-than-normal carnosine levels in both their muscle and brain cells -- levels about 63% below normal, which is similar to levels found in people in their 70's.¹⁷

The bottom line is that in addition to its life extension benefits, L-carnosine is beginning to emerge as an indispensable supplement for diabetics. It not only helps control primary factors in the onset of

diabetes, but it also protects against [diabetic echo effects](#) such as organ protein degradation, loss of kidney function,[18,19](#) damage to the eyes,[20](#) neuropathy,[21](#) and cardiovascular damage [22,23](#) -- not to mention actually helping the heart muscle contract more efficiently.[24](#)

Carnosine Helps with Wound healing

In a study published just last month, treatment with L-carnosine enhanced wound healing significantly. In addition, wound tissue analysis showed increased expression of growth factors and cytokines genes involved in wound healing.[25](#) And even further, in vitro analysis of human dermal fibroblasts (the cells that promote skin healing) and microvascular-endothelial cells (the cells responsible for regenerating new blood vessels after injury) showed that carnosine increases cell viability in the presence of high glucose. But this is not only important for diabetics. In fact, wound care for the elderly in long term and acute care facilities is often extremely difficult -- not to mention very costly for the facilities involved. Again, the connection between seniors in general and people with diabetes is the dramatically lower levels of carnosine in their cells shared by both groups. In other words, the benefits in wound healing experienced by diabetic patients is likely to be seen by the general senior population as well.

Carnosine Protects Against the Side Effects of Chemotherapy



The protective effects of carnosine in mouse bone marrow cells against damage to their genetic structure caused by the chemotherapy drug cyclophosphamide were reported in the April issue of *Cell Biochemistry and Function*.[26](#) In the study, mice were injected with solutions of carnosine at different doses for five consecutive days. On the fifth day of treatment, mice were injected with the highly toxic chemotherapy drug, cyclophosphamide. Blood cells and bone marrow were then examined. Carnosine significantly reduced both damage to blood cells and bone marrow toxicity normally induced by cyclophosphamide. It appears that the antioxidant capabilities of carnosine reduced the oxidative stress and genotoxicity induced by the chemotherapy drug.

In addition, cancer researchers are starting to identify how carnosine's antioxidant and anti-inflammatory capabilities may not only play a chemoprotective role, but actually help protect against cancer itself. How? First, as just mentioned in the paragraph above, carnosine helps block DNA damage that can lead to transformation of healthy cells into malignant cells.[27](#) In addition, it has demonstrated a significant ability to both inhibit tumor growth[28](#) as well as the metastasis of existing cancers.[29](#)

Carnosine Protects Against Alcohol Induced Liver Damage

In yet another confirmation of carnosine's ability to protect against damages from excess levels of sugar and alcohol in the bloodstream, a study published in the June issue of *Toxicology and Industrial Health* has shown that supplementation with carnosine is effective for both preventing and repairing biochemical alterations and morphologic damage in the liver caused by exposure to alcohol.[30](#) In other words, regular supplementation with carnosine might be worth considering if you're prone to regularly party down.

Carnosine Protects Your Brain

Two facts lend more credence to the idea that supplemental carnosine is beneficial to your brain. First, it has been known for some time that brain tissue naturally contains high levels of carnosine, which are capable of reducing the oxidative and glycemc stresses to which the brain is especially vulnerable.[31](#) Carnosine in brain tissue reduces inflammation, a harmful factor in and of itself,[32](#) and as we've already

discussed, carnosine reduces the accumulation of beta-amyloid plaque in the brain, a probable key factor in the onset of Alzheimer's. And of course, as I discussed 10 years ago, carnosine is an effective heavy metal chelator that crosses the blood-brain barrier and thus can help reduce the toxic impact of heavy metals that may accumulate in the brain.[33](#)

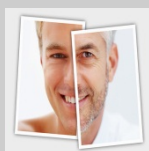
The second key fact is that more recent studies have shown that carnosine levels are actually significantly lower in patients with Alzheimer's and other neurodegenerative disorders such as Parkinson's disease than in people without those problems.[34](#) This might indicate either a carnosine deficiency that allows for the onset of the diseases (remember that carnosine levels are dramatically lower in pre-diabetics, diabetics, and the elderly) or that the diseases themselves exhaust the carnosine supplies in the brain. Or both together! Either way, numerous studies now point to the role carnosine might play in both protecting the brain from Alzheimer's and even Parkinson's disease, for that matter.[35](#),[36](#) Even more exciting, sufficient supplementation with carnosine may even play a role in helping to reverse at least some of that damage.

Conclusion

Make no mistake; L-carnosine may no longer be "new" news. And it may no longer be trendy; but it still ranks as one of the most important anti-aging supplements available to us today. Not only is it protective for all of the long-term conditions mentioned above, but it is probably the single supplement most likely to produce a visible "youthening" of your appearance in the shortest possible time -- three to six months.

The following may not be scientific proof, but it is worth considering. I'm turning 65 in February, and my sister still calls me Peter Pan. In fact, even though she's five years younger than I am, she always introduces me as her younger brother -- to avoid questions. I've been supplementing with 1,500 mg of carnosine a day (using my own formulas) for 10 years now. My skin looks years younger than my age. Neither my sister nor any of my other siblings supplement with carnosine. They don't look the same, so we're not talking genetics here.

It may not be scientific, double-blind-study proof -- but I'm just sayin!



Note: I still recommend using [a carnosine formula](#) similar to the one I put together ten years ago that also includes DMAE and Acetyl-L-carnitine to help remove the lipofuscin produced in the body as a side effect of carnosine's protective action. Over the years, I've tweaked and refined the ratios of the ingredients in the formula based on hands on results, but its essence has remained unchanged...because it works.

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