

Are Casein Supplements a Wise Health Investment?

By Dr. Mercola

Some foods can be quite controversial, making it difficult to make a definitive determination as to their benefit for health. Casein falls into this "gray" category, where the quality of the source and your chief health aim require careful consideration.

Casein is the main protein in raw milk, making up about 80 percent of its protein content. The other 20 percent is whey. Whey protein has a reputation as healthy fitness protein that support athletic performance and muscle growth, and is a common ingredient in sports nutrition powders, bars and drinks.

A primary difference between whey and casein is that whey is digested very quickly, making it an ideal recovery meal, whereas casein is a slow-digesting protein with anti-catabolic properties, meaning it helps reduce muscle breakdown, even in the absence of food.

Whey also has one of the highest concentrations of the branched chain amino acids leucine, isoleucine and valine, which are potent stimulators of muscle growth through activation of the mTOR pathway.

Types and Forms of Casein

The two main forms of casein are micellar casein — the most popular form in sports nutrition — and casein hydrolysate, which is predigested and more rapidly absorbed than micellar casein.

Casein can also be divided into three main types: native whole milk casein from raw milk, cheese casein and industrial casein. As noted by fitness expert Ori Hofmekler, author of "Unlock Your Muscle Gene," there are significant differences between these three types.

Casein is typically extracted using acid and/or heat processing, and therein lies a major part of the problem. Many casein products on the market are inferior in quality, and may even contain toxic residues. As for its value as a beneficial protein for muscle growth, opinions and scientific evidence varies depending on the details.

Hofmekler notes that while native whole milk casein (consisting of protein clusters called micelles, bound with calcium, phosphate and citrate ions) is the most functional, as it

"complements your body's acid-base balance and will not cause an overly acidifying effect," the same cannot be said for most industrial caseins, which are highly acidifying.

Moreover, many have casein sensitivities, and if you fall into this category, you would probably want to avoid casein supplements no matter how high the quality. Common side effects of casein include indigestion or heart burn, bloating, allergic reactions or bad aftertaste.

Protein supplements such as casein are also contraindicated for those with kidney or liver disease, as they need to be mindful of restricting their protein intake.

Remember to Avoid Over-Consuming Protein

That said, I believe a strong case can be made that ALL people can benefit from limiting protein to just what your body needs. If you're an athlete or bodybuilder, you do need more, but eating tons of protein may backfire, as you're choosing physical performance over long-term health and longevity.

A near ideal protein intake may be around one-half gram of protein per pound of lean body mass. Athletes, pregnant women and older people need about 25 percent more.

Eating more protein than your body actually requires can stimulate an important biochemical pathway called the mammalian target of rapamycin (mTOR). This pathway plays an important role in many cancers.

When you reduce protein to just what your body needs, mTOR remains inhibited, which helps minimize your chances of cancer growth.

Which Casein Is the Best?

Native casein made from raw milk has distinct anabolic properties, making it an effective muscle-building protein. Due to its slow absorption, it provides a sustained release of amino acids into your blood circulation for several hours.

Hence it can be used to maintain your muscles in a sustained anabolic mode for a prolonged period of time, such as during sleep. Whole milk casein also provides leucine, ^{1,2} which is a powerful muscle builder when obtained from whole food. Products that are similar to native casein are:

- **Milk protein concentrate (MPC)**, a stable, whole protein produced by membrane filtration of milk. This filtration yields an end product that contains casein and whey at ratios nearly identical as that in the milk.

MPC has virtually identical properties as native casein, and its neutral-to-alkaline pH and

stable, water-soluble state makes it resistant to heat damage. The best MPC products are derived from raw milk from organic, grass-fed cows.

- **Micellar casein** is processed in a similar way as MPC, but here the casein micelles are separated from the whey via microfiltration. This lowers its functional value, as micellar casein has poor water-solubility.

Typically, a protein powder needs to be reconstituted with liquid, and if it cannot dissolve fully, it loses functional value.

You can increase solubility by using warm liquid. However, micellar casein is also unstable, and tends to deteriorate when stored over time. According to Hofmekler: "Micelles' interactions lead to cross-linking of proteins, migration of fat particles to the surface, and degradation of the casein."

This means that though micellar casein is acclaimed to be superior to other industrial caseins, it is yet unstable and thus inferior to native casein and cheese casein. And it may contain undesirable additive residues, such as salts, sodium caseinate and polydextrose."

He recommends doing your homework before buying a micellar casein product, and ask the product provider for an updated certificate of analysis (CofA) and an independent lab report to prove the product's protein integrity.

Milk and Cheese Casein Versus Industrial Casein (Protein Isolates)

Cheese casein differs from raw milk casein, but it too has beneficial muscle-building properties. Cheese casein is obtained from the manufacturing of cheese — the curd that remains from the process is a whole, complete protein.

Being similar to native casein, it provides a slow and efficient nutrient delivery. According to Hofmekler, industrial caseins are best avoided. Unlike native casein and cheese casein, industrial caseins are all protein isolates, most of which are extracted from ultra-pasteurized milk using extreme acid and/or heat processing.

The processing typically yields a protein that is deficient in methionine (an essential amino acid) and cysteine (a conditionally essential amino acid). Both are destroyed during the processing, and these sulfur-containing amino acids are important for optimal immune function.

What's worse, ultra thermolyzed (ultra-heated) casein has been linked to increased risk of colon cancer.^{3,4,5} It's a highly denatured protein that cannot be fully digested. As a result, undigested protein can reach your colon, where bacteria ferment the protein into

carcinogenic phenolic compounds.⁶ Hofmekler explains:

"Technically, heated protein gets carcinogenic due to changes in their molecular integrity; reduced digestibility and increased nitrogen waste. The reduced digestibility of cooked proteins increases the load of nitrogenous waste material reaching the colon via fermentation to ammonia and phenols — both of which are cancer promoters."

You can counteract this risk to some degree by eating plenty of digestive-resistant starches and other soluble fibers. These serve as substrates to feed beneficial gut bacteria and increase carbohydrate fermentation in your colon. By feeding these helpful bacteria, you also reduce the level of colonic protein fermentation — along with the risk of colon cancer.

Benefits of High-Quality Casein

As mentioned, reduced muscle breakdown is one of casein's main benefits. A recent article by Authority Nutrition delves into some of the proposed benefits of casein, and explains the science behind its muscle-sparing effects thus:⁷

"In one study,⁸ researchers gave participants either whey or casein protein and then measured their total breakdown rate for the amino acid leucine over a seven-hour period. They found the total breakdown rate of leucine was around 25 percent higher in the whey protein group."

This means that the casein group reduced the total amount of protein burned for fuel over a seven-hour period. That means an improved net protein balance, a key factor for muscle growth and retention.⁹ Bottom Line: This protein is anti-catabolic. It reduces protein breakdown within the body due to its slow digestion rate and sustained supply of amino acids to muscle cells."

Preliminary studies have also found casein may provide other health benefits besides muscle growth and muscle-sparing, including the following:

- Antibacterial activity
- Improved immune function¹⁰
- Lowered triglyceride levels¹¹
- Antioxidant effects^{12,13}
- Greater fat loss¹⁴

Why I Do Not Favor Casein Supplements

Personally, I don't recommend casein supplements. High-quality whey protein from organic grass-fed cows is my preference. My objections to casein can be summarized as

follows:

- Many have casein sensitivity, and in these cases, you will likely experience problems even if you use the best, highest-quality casein on the market.
- Milk is very high in sugars (galactose), so you can quickly end up with a high net carb count (total carbs minus fiber) when consuming whole, raw milk. (Butter is far better than milk in this regard, as it's lower in galactose and higher in healthy fats.)
- You have milk-derived opioid receptors in your brain, and casein contains natural opioids called casomorphins.¹⁵ (This is why you can become "addicted" to dairy products like milk and cheese.) We know that low-dose naltrexone (LDN) is very effective for boosting immune function by blocking these receptors. Conversely, by continually stimulating these opiate receptors, you could potentially disrupt your immune function.

As explained by Dr. Thomas Cowan, a family physician and founding board member of the Weston A. Price Foundation (WAPF), who is well-versed in the use of LDN for autoimmune diseases, exogenous opiates (opiates from outside sources; not naturally made by your body) are in fact potent immune suppressors.

A famous study called the European Prostitute Study showed the primary risk factor for HIV and AIDS was not sexual exposure, not IV exposure, but opiate exposure. According to Cowan, you see a similar pattern in cancer patients. As soon as they start taking opiates for chronic pain, their health rapidly declines as their immune system falters.

So if you are immune challenged, it would be wise to avoid casein altogether, and for those who aren't, it would be a good idea to limit its use to times when you need extra protein for strength training. But I personally believe whey protein is a superior alternative for this.

- Casein can indeed be effective for muscle growth. However, there's a choice to be made: Either you're optimizing performance, or you're optimizing health and longevity.

Used occasionally and in limited amounts, it's unlikely to do any major harm and may benefit your athletic performance, but "protein loading" in general to maximize muscle may raise your risk of long-term health problems such as cancer (by stimulating mTOR), and if using casein in excess, it could potentially have an adverse effect on your immune function.

- Last but not least, so many of the casein supplements on the market are of poor quality, either due to their source or the processing. The longer a protein is heated the more degraded and toxic it gets. So if you do opt for a protein supplement, make sure it does not include thermolyzed (heat-treated) casein, which has shown to be the most carcinogenic among thermolyzed foods. This includes casein and whey isolates as well as

all caseinates.¹⁶

Also avoid whey proteins derived from ultra-pasteurized milk. If the whey manufacturer fails to provide you with a certificate of conformity (CoC) that clearly declares their whey is manufactured from raw milk, then it's most likely been ultra-pasteurized.

Final Notes

As you can see, there are pros and cons to take into account. At bare minimum, you'd be wise to do your homework to make sure you're getting a high quality casein supplement if you decide you want to use it as a muscle promoter. Your best options are native casein found in whole, raw milk, and cheese casein found in aged cheese and cottage cheese. A close alternative is MPC.

Just be aware of the fact that excessive use — especially if you're using a heat-treated or otherwise inferior quality product — could have drawbacks, potentially raising your risk for certain health problems, including lowered immune function and colon cancer.

Others may disagree with these conclusions, and I admit I have not firmly established a foundation of evidence against the use of casein. However, I have my suspicions, which will remain until or unless I find sufficient evidence to modify or discard them entirely.