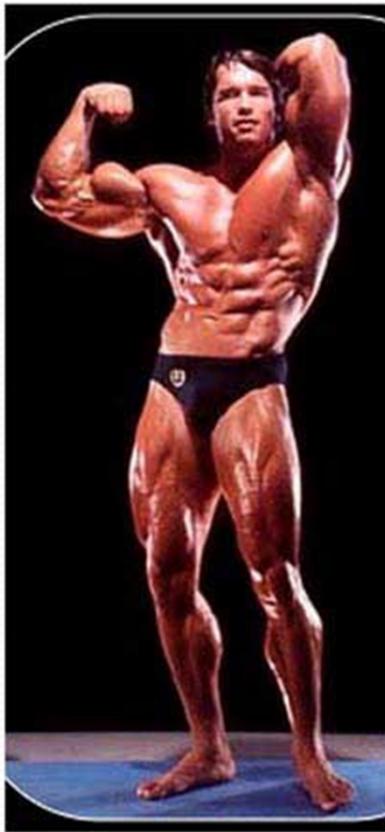


Casein protein supplements

THEN



"I'll be back!"

NOW



"Oh, my back!"

By: Sandi Chrisman
and Mary White

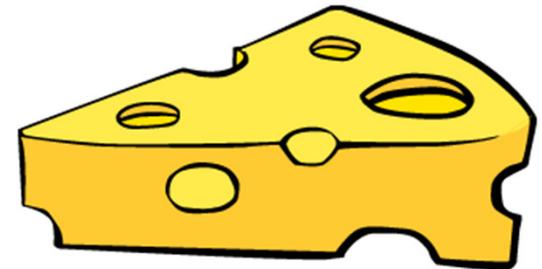


Outline

- Food sources
- Supplements
- Marketing claims
- Structure
- Bioavailability
- Research studies
- Safety
- Questions
- References

Food Sources of Casein

- Dairy Products
 - Milk (80% casein, 20% whey)
 - Cheese
 - Yogurt
 - Ice Cream
 - Cottage Cheese
- Casein Powder
 - “Protein Shakes”



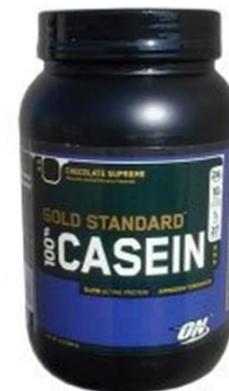
Casein Powder Supplements

- 100%, “pure” casein powder
- Some powders are blended with other proteins:
 - Egg protein
 - Whey protein
- Flavors:
 - Vanilla
 - chocolate
 - Strawberry
 - banana cream
 - cookies ‘n cream



Casein Powder Supplements

- Directions for use: mix powder with water or milk; or add to smoothie
- Price: \$20.00 and up

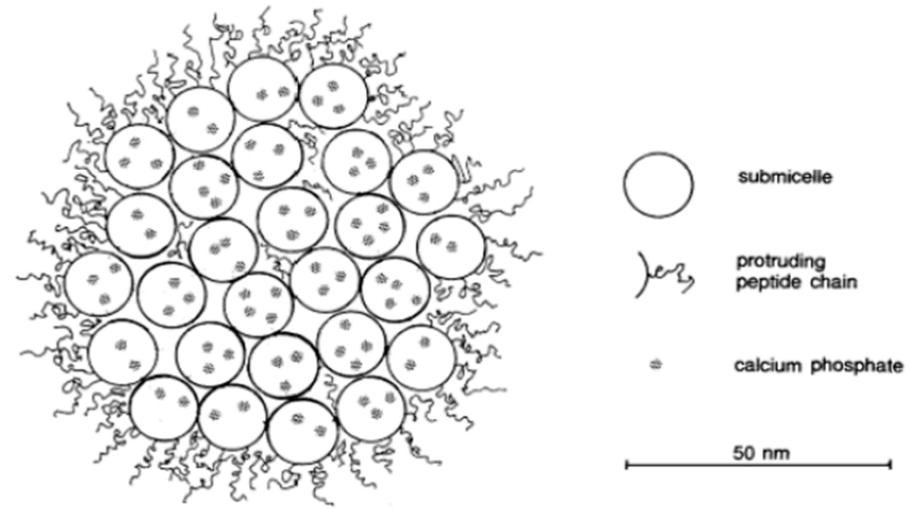
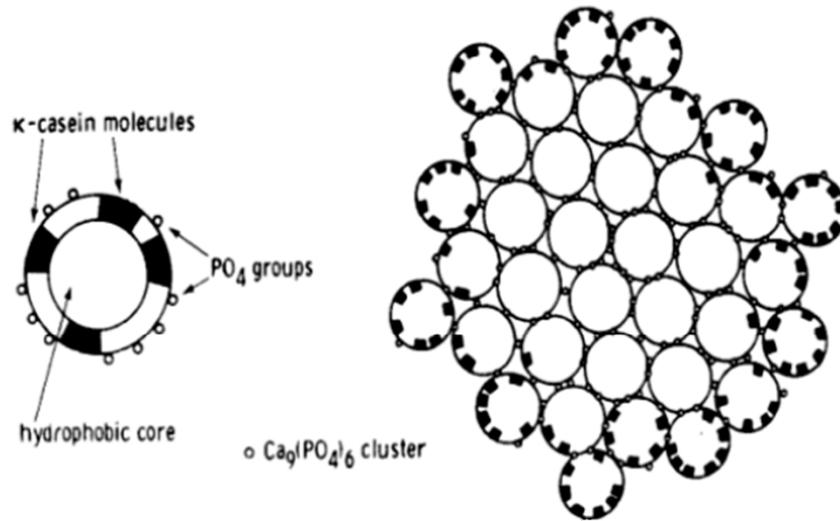


Media Marketing Claims:

- Easily generate bulk and general health
- Increased muscle growth rates
- Slow digestion rate – improves absorption of vital amino acids.
 - Amino acids can be absorbed for up to 7 hours following ingestion.
- It's the best meal replacement supplement available in the market today
- Suppresses protein breakdown – muscle sparing.



Chemical Structure of Casein: (still under investigation)



Bioavailability of Casein

- Absorption can take up to 7 hours
 - Suggested use: before bed to sustain protein levels all night



Study 1: Journal of Nutrition

“Dietary Protein Level and Aflatoxin B-Induced Preneoplastic Hepatic Lesions in the Rat”

T. Colin Campbell and George E. Dunaif

ABSTRACT

Previous studies have shown that the development in rats of aflatoxin B₁ (AFB₁)-induced γ -glutamyl transpeptidase (GGT) positive (GGT⁺) foci, indicators of early preneoplastic liver lesions, was markedly greater when a 20% casein diet was fed than when a 5% casein diet was fed during the postinitiation period. In the present study, the dose-response between dietary protein level (dose) and emergence of AFB₁-induced GGT⁺ foci (response) in livers of rats was determined. Male Fischer-344 rats fed a 20% casein diet were orally administered AFB₁ at a dose level of 250 ng (kg d) (10 doses over 12 d). One week after the last dose, the animals were divided into eight groups and fed isoenergetic diets containing either 4, 6, 8, 10, 12, 15, 20 or 30% dietary casein for the remaining 12 wk of the study. The development of GGT⁺ foci, as measured by number and percent of liver volume occupied, displayed a response with three discrete phases. The lowest dietary protein levels, 4, 6, 8 and 10% casein, were associated with a minimal level of GGT⁺ foci development. Between 10 and 12% dietary casein, the development of GGT⁺ foci sharply increased, up to the 15–30% dietary casein level. The sudden increase in the formation of GGT⁺ foci at 10–12% dietary casein was just above the level of dietary casein (6–8%) required for maximum body weight gain. These results in this animal model suggest that protein intake in excess of that required to sustain maximum growth rate may enhance AFB₁-induced cancer development
J. Nutr. 117: 1298-1302, 1987.

Summary of Study 1

- Subjects: 344 – 40g rats
- Methods:
 - All rats were put on a 20% casein diet for 2 weeks before receiving Aflatoxin-B₁ (AFB₁)
 - AFB₁ was mixed with tricaprylin and was administered through a stomach tube 10 times daily, Monday through Friday for 2 consecutive weeks to all rats except a control group
 - Rats split into groups and were given a control diet (no casein), 4%, 6%, 8%, 10%, 12%, 15%, 20%, or 30% casein diet for remaining 12 weeks of the study. Rats in control group stayed on 20% casein diet.



Summary of Study 1 (cont.)

- Results:
 - Lowest levels of casein (4, 8, 6 and 10%) had no increased levels of hepatic lesions
 - Rats fed a 12, 15, 20, and 30% casein diet had the highest levels of hepatic lesions, with the highest amount of lesions occurring in rats fed a 20% casein diet
- Conclusion: Casein intake is strongly associated with pre-cancerous lesions in rats when exposed to AFB₁
 - More research needed to conclude this is the case for humans



Study 2: Journal of Hepatology Inhibition of Hepatocellular Carcinoma Development in Hepatitis B Virus Transfected Mice by Low Dietary Casein

ABSTRACT: In a comprehensive human ecological study, primary liver cancer has been shown to be highly significantly associated with 1) the prevalence of persistent infection with hepatitis B virus (HBV) and 2) plasma cholesterol concentrations that are, in turn, associated with the consumption of animal based foods. In rat studies, aflatoxin-induced hepatocellular carcinoma is substantially prevented by decreasing the intake of animal based protein (casein), a hypercholesterolemic nutrient. Thus the development of primary liver cancer associated with persistent HBV infection or with aflatoxin exposure may be controlled by reduced intake of animal-based proteins. Transgenic mice transfected with an HBV gene fragment containing the viral transactivator of hepatitis B virus, HBx, which induces the formation of hepatocellular carcinoma, were used to examine the ability of dietary casein to modify tumor formation. Reducing the concentration of dietary casein to 6% from the traditional level of 22% markedly inhibited (by 75%) hepatic tumor formation in these transgenic mice. Tumor development also was substantially altered by interchanging dietary casein concentration well after tumor development had begun (at 8 months), increasing by 173% from the expected yield when casein intake was increased and decreasing by 99% when casein was reduced. These findings suggest that the development of liver tumor formation among individuals persistently infected with HBV may be controlled by minimizing or eliminating the intake of animal protein-based foods. HEPATOLOGY 1997;26:1351-1354.)

Summary of Study 2

- Methods:
 - Male transgenic mice exposed to HBV were fed 6, 14, 22% casein diets to observe effect on liver cancer
 - At 8 months the diets between the control and study group were switched





Summary of Study 2

- Results:
 - Mice fed low casein diets had 99% less liver lesions, and livers weighed less
 - Cholesterol levels were lower in the mice fed low casein
 - Decreased tumor growth
- Conclusion:
 - Reduced intake of dietary casein is strongly correlated with decreased risk for tumor growth



Safety of Casein

- Allergies
 - Be aware of the potential for an allergy to casein, get tested
- Cancer – numerous studies have shown that casein protein can promote cancer growth
 - Use extreme caution if genetically predisposed to cancer



Question 1:

What are some food sources of casein?

All dairy products

Isolated casein supplements/powders



Question 2:

True or False: Casein supplements have no effect on cancer development.

False – there is a direct correlation between casein consumption and tumor growth

References

- <http://www.micellarcaseinproteinpowder.com/>
- <http://www.mens-total-fitness.com/casein-protein.html>
- <http://rdo.psu.ac.th/sjst/journal/27-1-pdf/19casein-micelle.pdf>
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