Let's Excel Together

CANADIAN ACADEMY OF SPORTS NUTRITION

Lecture 15:

Protein Powders

Part 2

Copyright Protection:

Protein Powders:

- Whey protein.
- Casein protein.
- Soy protein.

Casein Protein:

- **Casein is the solid portion of milk left after separating the liquid portion (whey) during cheese production.**

- **It is a type of protein that constitutes about 80% of cow`s milk and 35% of human milk.**

	Cow Milk	Human Milk
Whey Protein	20%	65%
Casein Protein	80%	35%

Digestibility and Absorption:

- **Casein is a phosphoprotein that has a chemical structure very similar to that of gluten.**
- **When mixed with acidic contents of the stomach, it clumps and creates a glue – liked gel, leading to a slow digestion and a relatively sustained release of amino acids into the blood stream.**
- **This is why casein is sometimes called "slow protein".**

- **Contrary to whey and egg proteins, casein is not denatured when heated.**

- **Protein denaturation is a process in which a protein loses the configuration of its chemical structure due to a denaturing agent, such as heat. A protein may lose its biologic function when denatured.**

- **The biologic value (BV) of casein is 77, which is much lower than that of whey protein.**

Compositions of Casein:

- **Amino acid compositions of casein are different than those of whey, soy, and egg proteins .**
- **Casein has higher amounts of the amino acids glutamine and proline, while whey protein is higher in BCAAs (branched – chain amino acids).**
- **Casein may contain small amounts of carbohydrates, calcium, and phosphorous.**

Indications of Casein Protein:

- **Casein is not as popular as whey protein in the world of sports.**
- **It is extensively used in both medicine and food industry as a binder.**

Athletic Indications of Casein Protein:

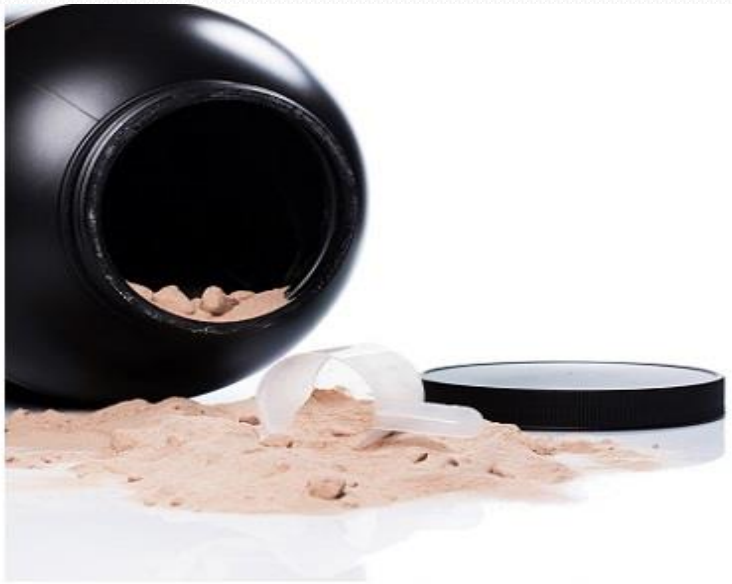
- **Though casein has a low biologic value, it inhibits muscle breakdown to a greater degree than whey due to its capacity to get absorbed slowly and deliver amino acids to the body in a sustained manner.**

- **Whey protein is good for *building muscle mass*, and casein protein is good for maintaining muscle mass.**

- **Casein has a higher amount of the amino acid proline. It is a key component of collagen and joint cartilage. As such, casein is preferred among athletes in the following conditions:**
- **a) Maintaining muscle mass.**
- **b) Recovering from sports injuries, especially tendinitis and bursitis.**
- **c) Maintaining joint health and flexibility.**

Athletes from the following sports may benefit the most from casein protein:

- **a) Athletics: discus throw, hammer throw, and shot pot.**
- **b) Bodybuilding.**
- **c) Fitness modeling.**
- **d) Power lifting.**
- **e) Weightlifting.**



Non – Athletic Indications of Casein Protein:

Casein protein has some advantages to whey protein in the following conditions:

- **a) Osteoarthritis.**
- **b) Burns.**
- **c) Wound healing.**

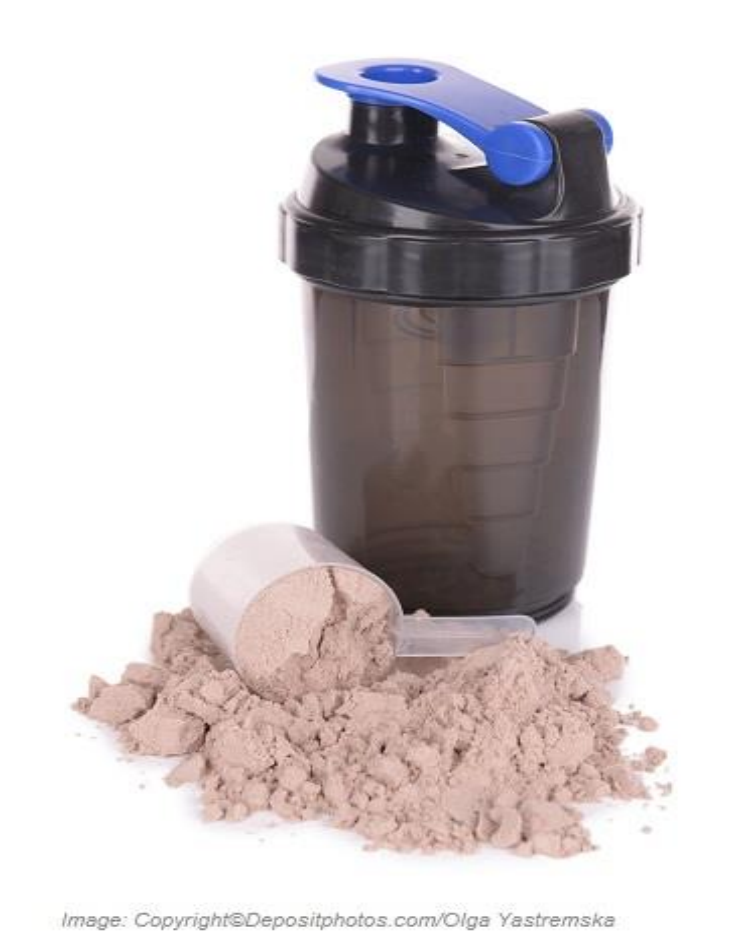
How to Take Casein Protein:

- **Casein protein is not easily dissolved in water. This is why the casein powders in the market are "*instantized*" in order to make it easily – soluble in water.**

- **In general, one serving (about 30 grams) of casein powers provides 24 – 26 grams of casein protein. They also contain calcium 50 – 60% of daily value per one serving.**

- **Because of its ability to release amino acids in a continuous manner, *casein protein is usually taken before bed*.**

- **You may mix it with water, milk, or any other drinks.**



Interactions and Cautions:

- **1) Casein protein should not be taken at the same time with most medications, as its glue – like activity may conglomerate the medications, decreasing their absorptions and effectiveness.**

- **2) Casein peptides have interactions with medications for high blood pressure. In fact, casein peptides may increase the effectiveness of those medications, leading to a significant drop in blood pressure.**

- **Also it is recommended that you stop taking casein protein 2 – 3 weeks before any elective surgeries, as it may interfere with controlling blood pressure during surgery.**

Extreme caution in the following medical conditions:

- 1) Liver diseases.
- 2) Kidney diseases.
- 3) Chronic pancreatitis.
- 4) Hartnup syndrome.
- 5) Cystinuria.
- 6) Celiac disease.
- 7) Autistic disorders.

Contraindication of Casein:

Casein protein should be avoided in the following medical conditions:

- **1) Acute renal failure.**
- **2) Hepatic encephalopathy.**
- **3) Diabetic nephropathy.**
- **4) Rhabdomyolysis (post – trauma/exercise myoglobinuria).**

Side Effects:

- **The side effects of casein protein are the same of those of whey protein.**
- **Allergic reactions to casein protein are more common than to whey protein.**

Soy Protein:

- **Soy is the least commonly used protein among athletes.**

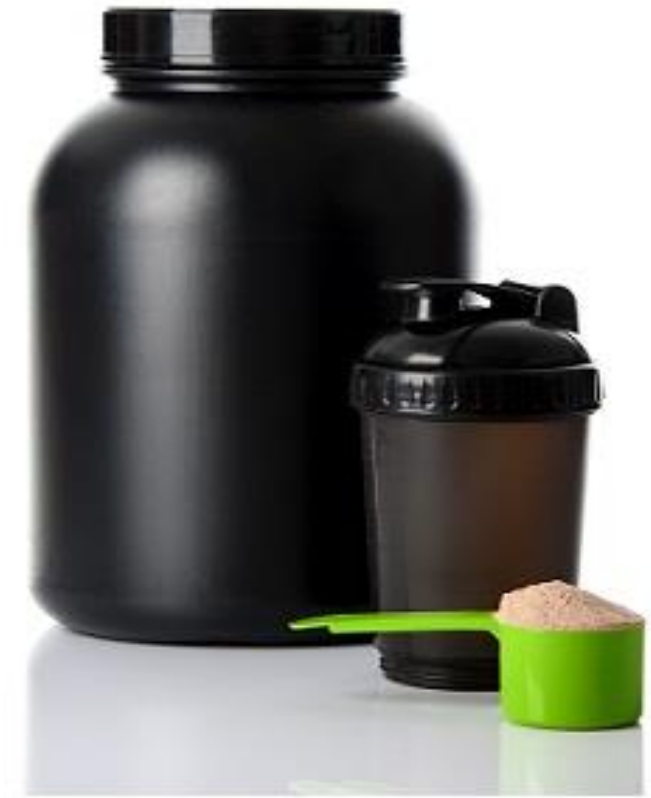


Image: Copyright©Depositphotos.com/Lebval

- **It is probably a common supplement among vegetarians.**
- **Soy protein is a complete protein that comes from soybean.**
- **Soybean is considered a legume.**

Digestibility and Absorption:

- **Soy protein has the biologic value (BV) of 74, which is lower than those of whey (with BV over 100) and casein (with BV of 77).**

- **Though soy is a compete protein and has all the essential amino acids, it is considered a low quality protein.**

- **The digestibility of soy protein is about 95%, while it is 65% for soybeans.**

- **The absorption of soy protein is faster than that of casein protein and slower than that of whey protein.**

Compositions of Soy:

- **Compared to whey, soy is higher in glutamine.**

- **A unique compound in soy protein is phytoestrogens. They are phytonutrients with many health benefits. The estrogenic effects of soy are more prominent in female athletes than male athletes.**

- **The main phytoestrogens in soy protein are isoflavones, of which genistein and daidzein are the major ones. Isoflavones are important in bone health.**

- **Another distinctive ingredient of soy protein is "lunasin". It is a soy dipeptide that can be found in rye, barley, and wheat as well.**

- **It is claimed that lunasin has anti – inflammatory and anti – cancer activities, particularly against leukemia.**

Isoflavones in Soy Products:

Soy products	Isoflavones (mg per one gram of the product)
Soy flour	2.6
Fermented soybean	1.3
Fried soybean curd	0.7
Cooked soybean	0.6
Soy protein powder	0.5
Soybean curd	0.5
Soy milk	0.4
Soybean paste	0.4
Soy sauce	0.015

Athletic Indications of Soy Protein:

- a) Female Athlete Triad Syndrome (FATS).
- b) Vegetarian and vegan athletes.
- c) Female athletes with any estrogen – sensitive cancers.
- d) Elderly female gym – goers with Osteoporosis.

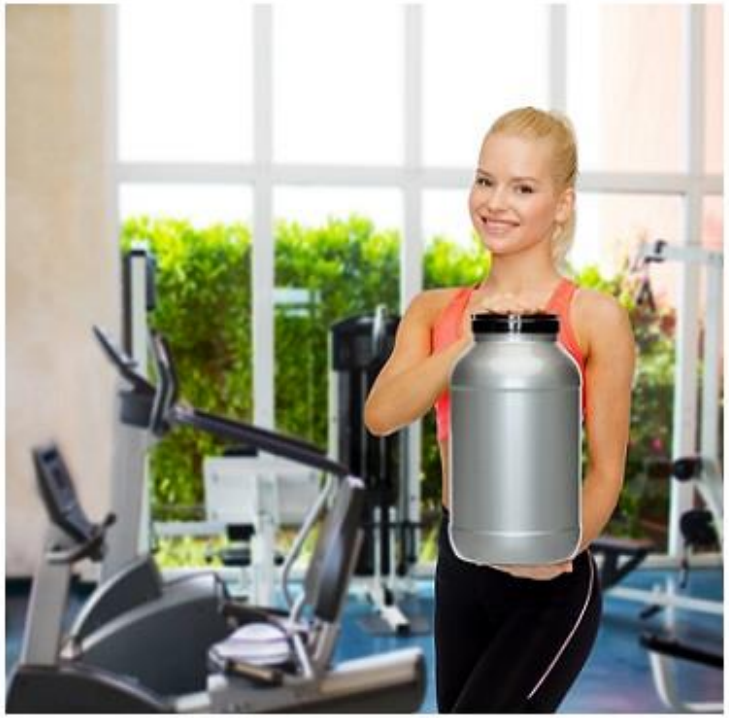


Image: Copyright©Depositphotos.com/Lev Dolgachov

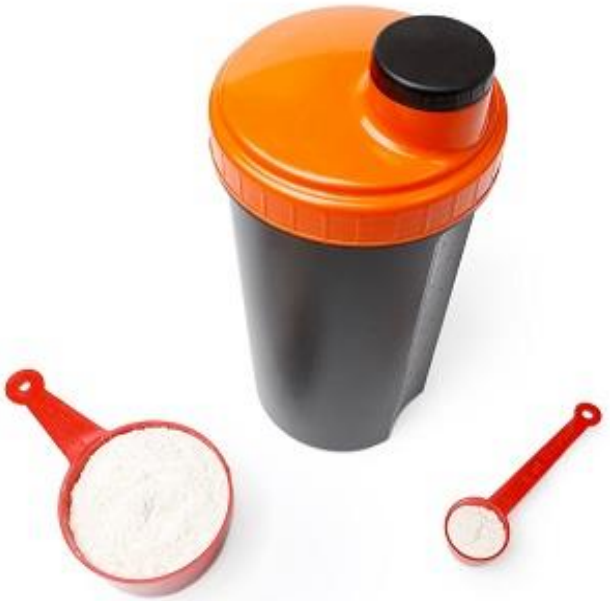
Non – Athletic Indications of Soy Protein:

- **a) High levels of LDL cholesterol and triglyceride.**
- **b) Menopause.**
- **c) Osteoporosis.**
- **d) Estrogen – sensitive cancers.**
- **e) Diabetes.**
- **f) Vegetarians and vegans.**
- **g) Infants with lactase deficiency (as soy – based formulas).**
- **h) Infants with galactosemia (as soy – based formulas).**

How to Take Soy Protein:

- **Soy protein is available in different formulations in the market, providing 20 – 25 grams of soy protein per serving.**

- **The recommended amounts are different in different conditions.**



-**Athletes:** 30 – 50 grams a day upon wake up or after exercise.

-**Athletes with Female Athlete Triad Syndrome:** 50 – 70 grams a day upon wake up or after exercise.

-**Menopause:** 30 – 60 grams a day of soy protein with 40 – 60 mg of isoflavones.

-**Vegetarians and vegans:** 30 – 60 grams a day.

-**High LDL cholesterol:** 30 – 60 grams a day.

-**Diabetes:** 30 grams a day.

- **Osteoporosis:** 40 grams a day of soy protein with 2 mg of isoflavones per one gram of powder.

Interactions:

- **a) MAOIs (monoamine oxidase inhibitors). These medications are used to treat depression and anxiety disorders.**

- **Fermented soy products contain tyramine. It is an amino acid that involves in regulating blood pressure and is needed to be metabolized by monoamine oxidase. MAOIs inhibit the breakdown of tyramine, leading to sudden increase in blood pressure.**

These medications include:

- - Isocarboxazid (Marplan).
- - Phenelzine (Nardi).
- - Selegiline (Emsam).
- - Tranylcypromine (Parnate).

- b) **Antibiotics:** they decrease the effectiveness of soy protein.
- c) **Probiotics:** they increase the effectiveness of soy.
- d) **Warfarin:** soy may decrease the effectiveness of this medication.
- e) **Birth control pills:** soy may decrease the effectiveness of these pills.
- f) **Tamoxifen:** soy may decrease the effectiveness of this medication.
- g) **Thyroid medications:** soy may interfere with the absorption of these medications.

Cautions:

Soy protein should be used with extreme caution in the following medical conditions:

- **1) Liver diseases.**
- **2) Kidney diseases.**
- **3) Chronic pancreatitis.**
- **4) Hartnup syndrome.**
- **5) Cystinuria.**

Contraindications of Soy:

- 1) Acute renal failure.
- 2) Hepatic encephalopathy.
- 3) Diabetic nephropathy.
- 4) Rhabdomyolysis (post – exercise myoglobinuria).

- **5) Low function thyroid. Some studies indicate that isoflavones in soy may inhibit TPO (thyroid peroxidase) and interfere with normal function of the thyroid. The amount of soy isoflavones that could affect the function of thyroid gland is about 30 mg per day.**

- **6) Children with congenital hypothyroidism. They should not be feed by soy – based formulas.**

- **7) Goiter.**

Side Effects:

- **Allergic reactions to soy protein are less common than to whey and casein proteins.**

Some other reported side effects of soy protein are:

- **Nausea.**
- **Constipation.**
- **Sleepiness.**
- **Fatigue.**

Homework:

- **1) Describe differences between Whey and Casein proteins.**

- **2) Describe athletic and non-athletic indications of soy protein.**