



The truth about soya:

A review of nutrition, health effects and addressing misconceptions

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Soya Protein

Soya Protein is a High-Quality Protein

- ❖ Highest protein quality among plant-based proteins
- ❖ Protein quality comparable to some animal-based proteins



Soya: High-Quality Protein

Soya Protein is a High-Quality Protein

- ❖ Highest protein quality among plant-based proteins
- ❖ Protein quality comparable to some animal-based proteins

What Constitutes a High-Quality Protein?

Complete Protein

Composition of essential amino acids

- **Contains all the 9 Essential Amino Acids** that our body cannot produce on its own

Animal-based protein
= Complete protein

Most plant-based proteins
= Incomplete proteins

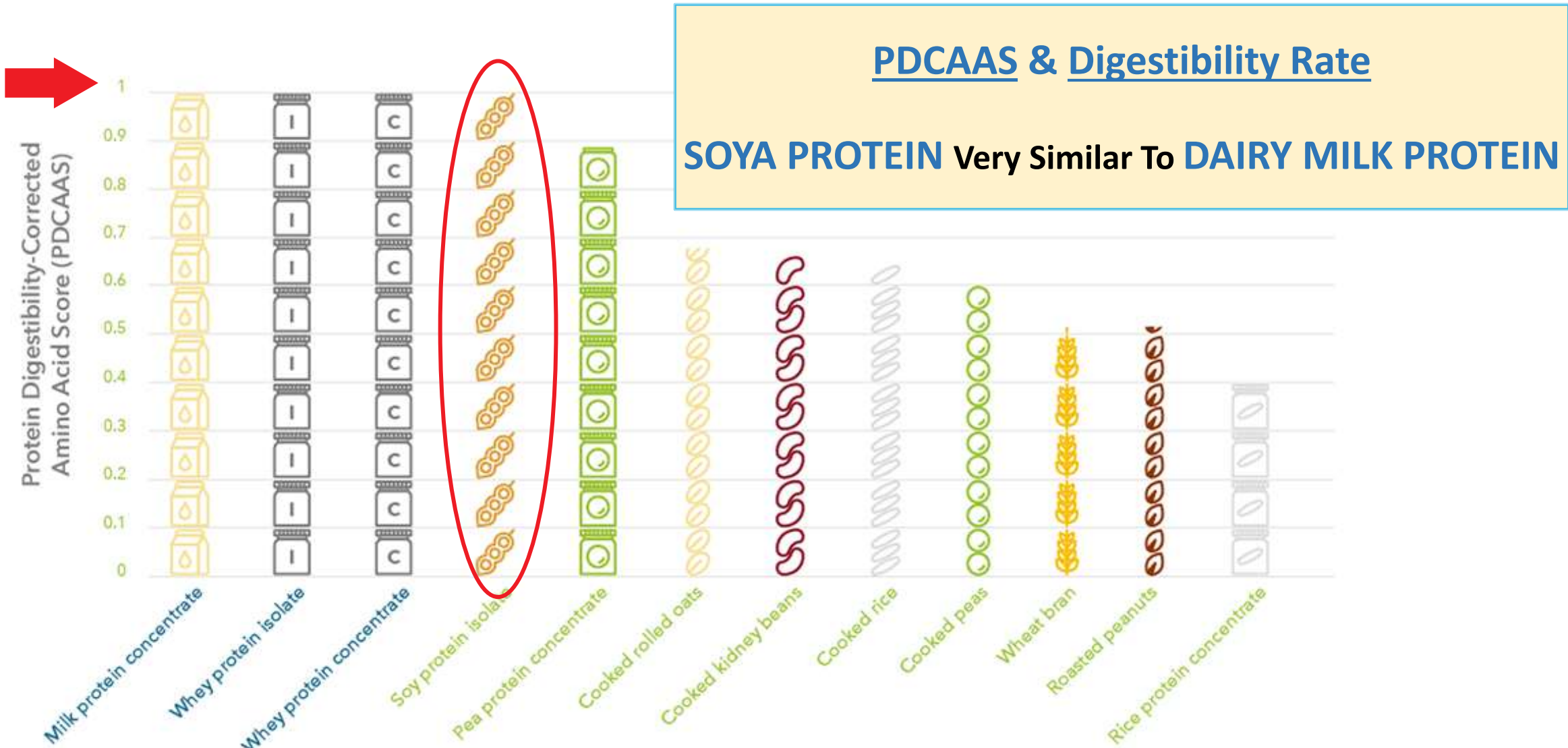
Protein Digestibility

Efficiency of amino acid utilization after digestion and absorption

- **PDCAAS* of 1** – one of the few plant-based proteins that is equivalent to animal-based protein
- Analysis of soya protein shows **high quality protein** that is comparable to meat, egg & dairy proteins

*Protein Digestibility-corrected Amino Acid Score

Protein Digestibility Corrected Amino Acid Score (PDCAAS)



Protein digestibility-corrected amino acid score (PDCAAS) for 12 protein sources

Recognition of Soya Milk as Alternative to Dairy Milk

RECOMMENDED AS ALTERNATIVE TO DAIRY MILK

- ✓ According to the 2020-2025 **U.S. Dietary Guidelines**, fortified soya milk was singled out as the only PBM that can serve as an alternative to dairy milk.



SUBSTITUTE FOR DAIRY MILK

- ✓ Fortified soya milk is **allowed as substitutes for milk** in the USDA Supplemental Nutrition Program for Women, Infants, and Children (WIC Program).



Key Nutritional Values of Soya



Macronutrients

- **Carbohydrate** - Fibre, Low GI (14-20), Lactose-Free
- **Protein** - Complete Protein
- **Fats** – Low in Fat, Rich in Essential Fatty Acids

Micronutrients

- **Calcium**
- **Iron**
- **Magnesium**

Bioactive Compounds

- Its absence does not disturb bodily functions
- Help to **prevent disease or promote health**
- Eg: lecithin, isoflavones, phytosterols, saponins, phytic acid

Health & Nutritional Benefits of Soya



Health effects of soya have been studied extensively for >30 years

Soya & Heart Health

- Soya may help protect against heart disease
- Studies have shown that 25 grams of soya protein per day
 - Lowers LDL-cholesterol
- May also lower blood pressure



Blanco Mejia, Sonia et al. "A Meta-Analysis of 46 Studies Identified by the FDA Demonstrates that Soy Protein Decreases Circulating LDL and Total Cholesterol Concentrations in Adults." *The Journal of nutrition* vol. 149,6 (2019): 968-981. doi:10.1093/jn/nxz020

Liu, X X et al. "Effect of soy isoflavones on blood pressure: a meta-analysis of randomized controlled trials." *Nutrition, metabolism, and cardiovascular diseases : NMCD* vol. 22,6 (2012): 463-70. doi:10.1016/j.numecd.2010.09.006



The Journal of Nutrition
Nutrition and Disease

A Meta-Analysis of 46 Studies Identified by the FDA Demonstrates that Soy Protein Decreases Circulating LDL and Total Cholesterol Concentrations in Adults

Sonia Blanco Mejia,^{1,2} Mark Messina,³ Siying S Li,^{1,4} Effie Vigiouliouk,^{1,2} Laura Chiavaroli,^{1,2} Tauseef A Khan,^{1,2} Korbua Srichaikul,¹ Arash Mirrahimi,¹ John L Sievenpiper,^{1,2,5,6,7} Penny Kris-Etherton,⁸ and David JA Jenkins^{1,2,5,6,7}

The US FDA approved a health claim for soy protein in 1999.

Many other countries have approved similar claims (eg UK, JP, MY, PH, ID, KR, CA)

All relevant studies were clinical trials conducted in normo- and hypercholesterolemic males and females ranging from 18 to 80 years of age.

A meta-analysis showed a statistically **significant reduction in total and LDL cholesterol levels with soya protein consumption** and no detrimental effect on HDL cholesterol and triglyceride levels.

**Soya protein significantly lowers LDL-cholesterol levels
→ consistent over the past three decades**

Other Health Benefits



Menopause:

Alleviate
menopausal hot
flushes

Bone Health:

Promote bone
health in post-
menopausal
women

Weight Mgmt:

Promote satiety

Muscle Mass:

↑ Muscle mass
↑ Muscle
Strength
to the same
extend as animal
proteins including
whey

Skin Health:

↓ Wrinkle depth
↓ Pigmentation
↑ hydration

(Post-menopausal
women who consumed
isoflavone-rich soya
protein daily for 6
months)

Messina, M., Duncan, A., Messina, V., Lynch, H., Kiel, J., & Erdman, J. W., Jr (2022). The health effects of soy: A reference guide for health professionals. *Frontiers in nutrition*, 9, 970364. <https://doi.org/10.3389/fnut.2022.970364>

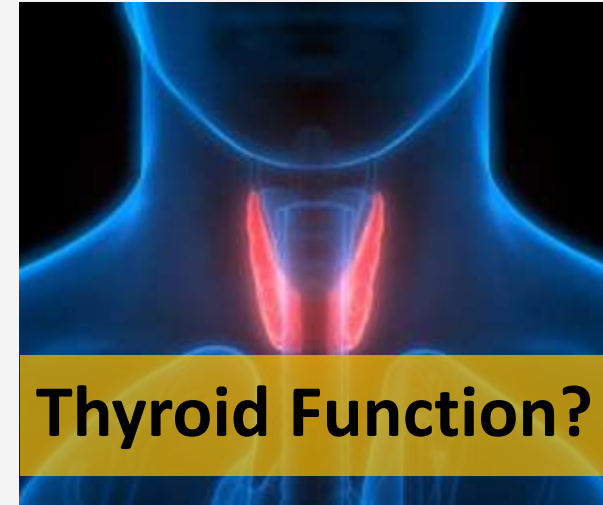
Rizzo J, Min M, Adnan S, Afzal N, Maloh J, Chambers CJ, Fam V, Sivamani RK. Soy Protein Containing Isoflavones Improves Facial Signs of Photoaging and Skin Hydration in Postmenopausal Women: Results of a Prospective Randomized Double-Blind Controlled Trial. *Nutrients*. 2023; 15(19):4113. <https://doi.org/10.3390/nu15194113>

**Is it Safe to
consume Soya?**

Myths vs Facts



Common Myths & Misconceptions



Myth #1: Soya causes breast cancer



Breast Cancer?

Common Misconception

“Taking soya will cause breast cancer.”

Myth #1: Soya causes breast cancer

FACT: Soya does not cause breast cancer



Breast Cancer

Why the Misconception?

1. The term “phytoestrogen”
2. Older studies based on mice

Soya Isoflavones (ISF) - natural phytoestrogens

Soya Isoflavones

Phytoestrogens (plant-based estrogens)

- Natural compounds found in soya beans
- Belong to phytonutrients → plant-based nutrients
- Mimic estrogen, but structurally different and significantly weaker than human estrogen

How Do They Work?

Potentially **Reduce Breast Cancer Risk**

- Act as mild estrogens ~ attaching to estrogen receptors in cells
- Compete with natural estrogen → limits estrogen activity

Soya Isoflavones



Human Estrogen

Do know that:

- ▣ Phytoestrogens do not turn into estrogen in the body.

Soya & Reduced Risks of Breast Cancer

Numerous scientific studies have consistently showed that:

- **Higher Intake** vs Lower Intake of Soya: **lower risks** of developing breast cancer (BC)
- More evident in Asian than Western Populations:
 - Asian women **begin eating soya early in life**
 - Asian women **consume soya significantly higher** than typically seen in the western countries

Soya Isoflavones may help ↓ breast cancer risk



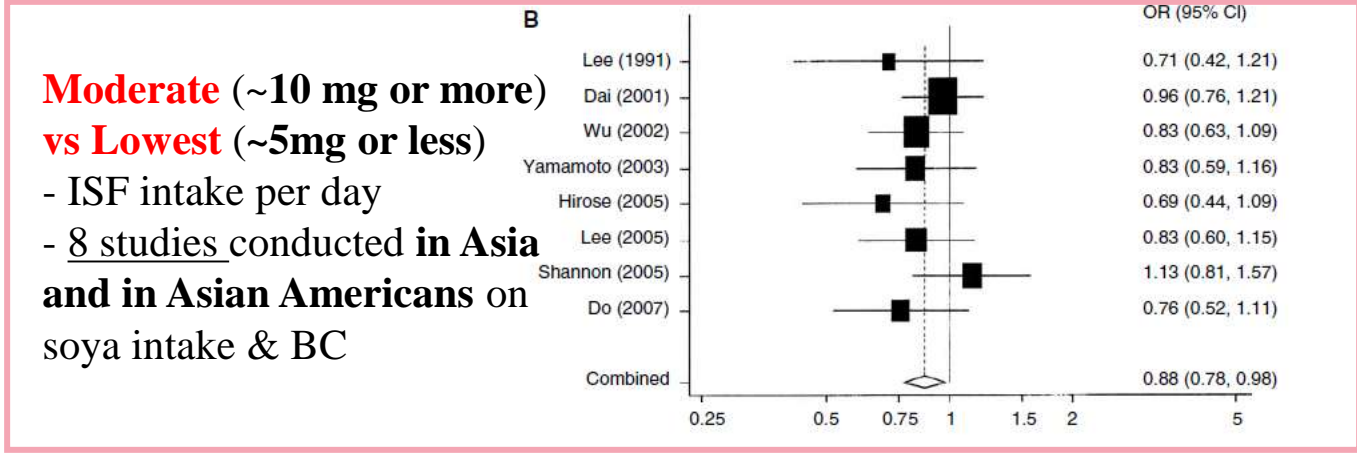
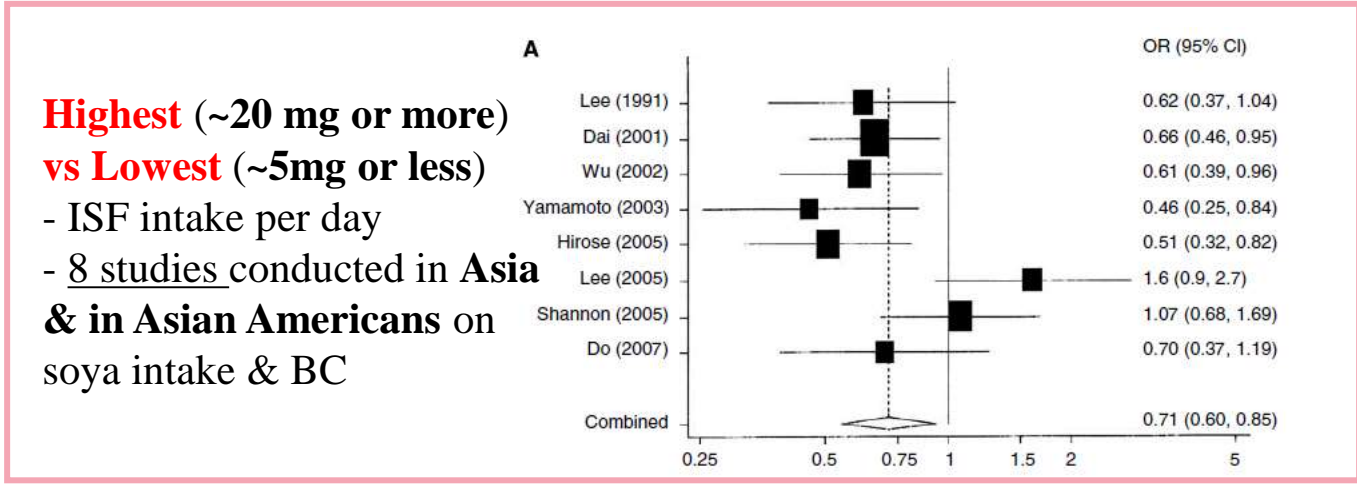
Br J Cancer. 2008 Jan 15; 98(1): 9–14.

Published online 2008 Jan 8. doi: [10.1038/sj.bjc.6604145](https://doi.org/10.1038/sj.bjc.6604145)

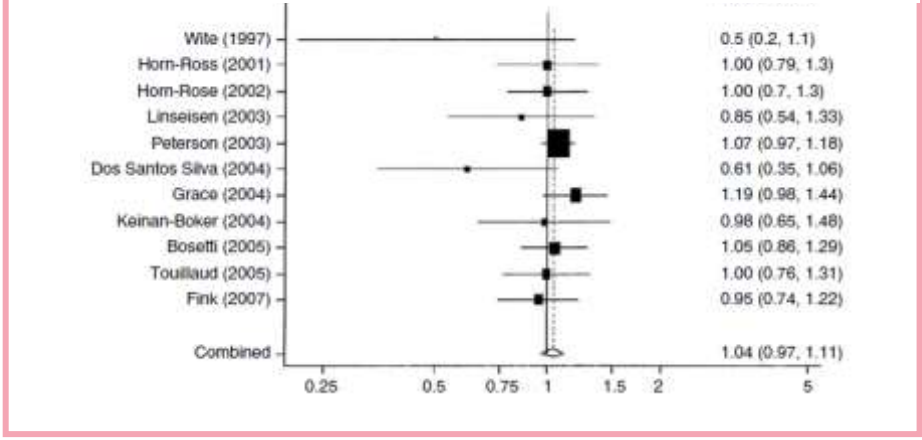
Epidemiology of soy exposures and breast cancer risk

A H Wu,^{1,*} M C Yu,² C-C Tseng,¹ and M C Pike¹

Meta-analysis of the 8 studies (1 cohort, 7 case-control) show a **significant trend of decreasing risk with increasing soya food intake.**



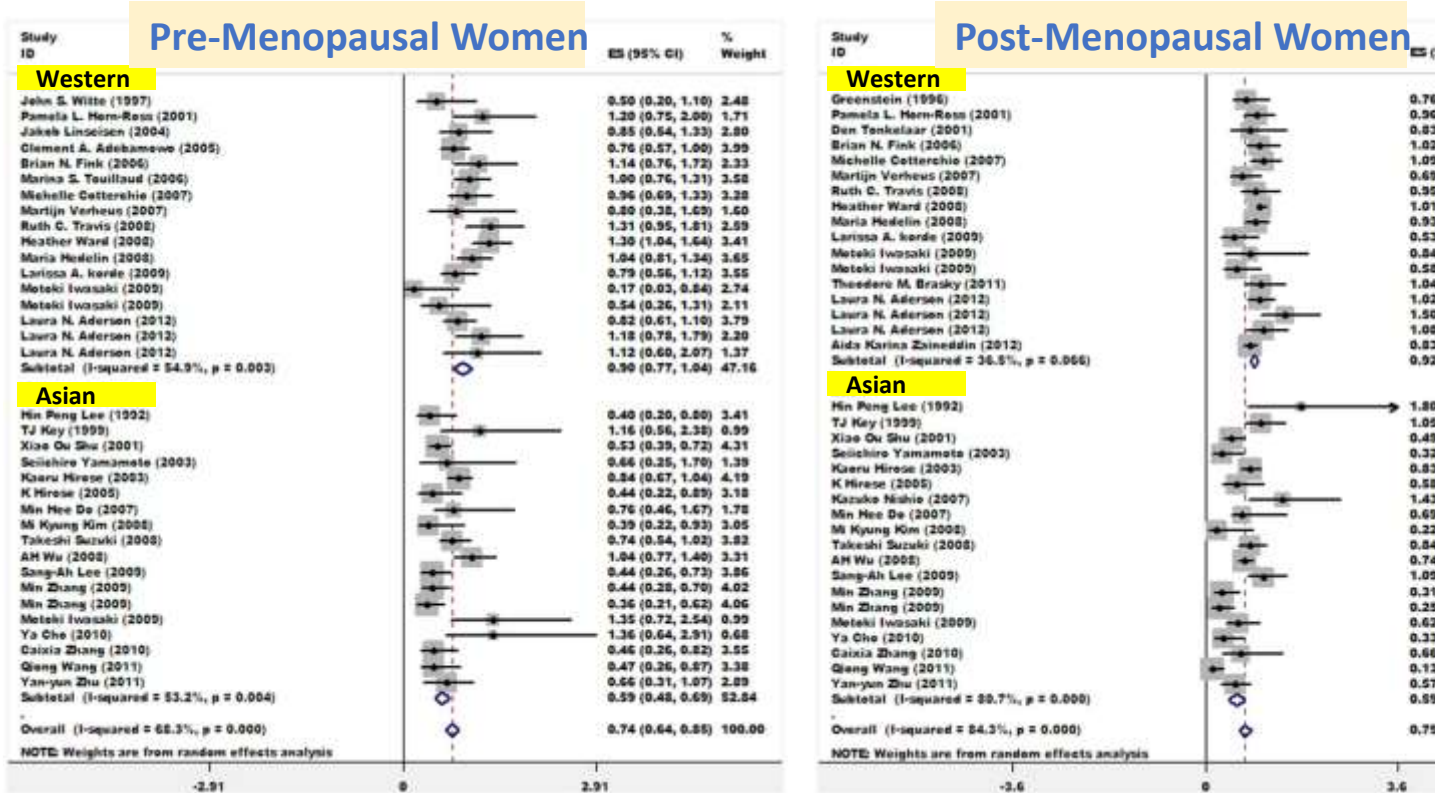
Highest (~0.8 mg or more) vs Lowest (~0.15 mg or less)
 - ISF intake per day
 - 11 studies conducted in **Western** populations on soya intake & BC



Association between Soy Isoflavone Intake and Breast Cancer Risk for Pre- and Post-Menopausal Women: A Meta-Analysis of Epidemiological Studies

Meinan Chen^{1,3}, Yanhua Rao^{3,9}, Yi Zheng¹, Shiqing Wei¹, Ye Li¹, Tong Guo², Ping Yin^{1*}

Meta-Analysis of 35 Studies



- Founded that soy isoflavone intake could lower the risk of BC for both pre- and post-menopausal women in **ASIAN COUNTRIES**.
- However, for women in **WESTERN COUNTRIES**, pre- or postmenopausal, there is no evidence to suggest an association between intake of soy isoflavone and breast cancer.

Associations between soy isoflavone intake and breast cancer risk in all studies and studies carried out in Asian or Western countries among pre- and post-menopausal women. Relative weights are indicated by the area of square. Horizontal lines represent 95% confidence intervals for the odds ratios.

Soya & Reduced Risks of Breast Cancer

Higher intake of soya may help protect against breast cancer

Clinical Trial > PLoS One. 2018 Sep 14;13(9):e0203469. doi: 10.1371/journal.pone.0203469. eCollection 2018.

A case-control study of breast cancer risk factors in 7,663 women in Malaysia

Min-Min Tan ^{1 2}, Weang-Kee Ho ^{1 2}, Sook-Yee Yoon ², Shivaani Mariapun ², Siti Norhidayu Hasan ², Daphne Shin-Chi Lee ², Tiara Hassan ², Sheau-Yee Lee ², Sze-Yee Phuah ², Kavitta Sivanandan ², Patsy Pei-Sze Ng ², Nadia Rajaram ^{1 2}, Maheswari Jaganathan ², Suniza Jamaris ³, Tania Islam ³, Kartini Rahmat ^{3 4}, Farhana Fadzli ⁴, Anushya Vijayanathan ⁴, Pathmanathan Rajadurai ^{5 6}, Mee-Hong See ³, Meow-Keong Thong ⁷, Nur Aishah Mohd Taib ³, Cheng-Har Yip ³, Soo-Hwang Teo ²

Meta-Analysis > Eur J Epidemiol. 2020 Jun;35(6):567-578. doi: 10.1007/s10654-019-00585-4. Epub 2019 Nov 21.

Soy intake and breast cancer risk: a prospective study of 300,000 Chinese women and a dose-response meta-analysis

Yuxia Wei ¹, Jun Lv ^{1 2 3}, Yu Guo ⁴, Zheng Bian ⁴, Meng Gao ¹, Huaidong Du ^{5 6}, Ling Yang ^{5 6}, Yiping Chen ^{5 6}, Xi Zhang ⁷, Tao Wang ⁷, Junshi Chen ⁸, Zhengming Chen ⁶, Canqing Yu ⁸,

Meta-analysis: 8 studies + CKB (total 631,498 women)

> Br J Cancer. 2008 Jul 8;99(1):196-200. doi: 10.1038/sj.bjc.6604448.

Soy intake and breast cancer risk in Singapore Chinese Health Study

A H Wu ¹, W-P Koh, R Wang, H-P Lee, M C Yu

Affiliations + expand

PMID: 18594543 PMCID: PMC2453029 DOI: 10.1038/sj.bjc.6604448

Review > In Vivo. 2022 Mar-Apr;36(2):556-562. doi: 10.21873/invivo.12737.






Soy Isoflavones and Breast Cancer Risk: A Meta-analysis

Ioannis Boutas ¹, Adamantia Kontogeorgi ², Constantine Dimitrakakis ³, Sophia N Kalantaridou ²

Meta-analysis: 8 studies from CN, JP, US, CA, AU



A Randomized Controlled Trial of Soy Isoflavone Intake on Mammographic Density among Malaysian Women

Nadia Rajaram ¹, Beverley Yap ¹, Mikael Eriksson ², Shivaani Mariapun ¹, Lee Mei Tan ¹, Hamizah Sa'at ³, Evelyn Lai Ming Ho ⁴, Nur Aishah Mohd Taib ³, Geok Lin Khor ⁵, Cheng Har Yip ^{1,6}, Weang Kee Ho ^{1,7}, Per Hall ^{2,8} and Soo Hwang Teo ^{1,3,*}



Observation Studies: Asian women
→ high soya intake is assoc. with 14-41% lower relative risk of breast cancer



RCT: Mainly **Caucasian / in Western world**
- Soy ISF supplements (purified, concentrated)
→ small, non-significant protective effect

The **1st Interventional Trial** of soya ISF with BC occurrence for **Asian Women** living in **Asia**

RCT to determine if a soy ISF intervention could reduce BC risk among peri- and postmenopausal Malaysian women, using **Mammographic density (MD)** as a biomarker of risk



100 mg/day ISF Supplement








50 mg/day Soy Food



Control Group

Article

A Randomized Controlled Trial of Soy Isoflavone Intake on Mammographic Density among Malaysian Women

Nadia Rajaram ¹, Beverley Yap ¹, Mikael Eriksson ², Shivaani Mariapun ¹, Lee Mei Tan ¹, Hamizah Sa'at ³, Evelyn Lai Ming Ho ⁴, Nur Aishah Mohd Taib ³, Geok Lin Khor ⁵, Cheng Har Yip ^{1,6}, Weang Kee Ho ^{1,7}, Per Hall ^{2,8} and Soo Hwang Teo ^{1,3,*}



- Avg f/u period of 13.3 months
- Total of 91 women (77.1%) completed the study
- Combined ISF Supplement & Diet groups
→ moderate & high ISF intake showed greatest absolute decline in MD among women
- Stratified by time since menopause (<5 yrs since menopause):
Absolute decline in MD (p = 0.13)
→ Supplement vs Diet vs Control: -5.9 vs -1.1 vs -0.8 cm²

5. Conclusions

We demonstrate a **plausible causal association between soy isoflavone intake and mammographic density change**, as a biomarker of breast cancer risk, among Asian women around or soon after menopause. However, due to the limited sample size in this trial, the findings should be interpreted with caution and require confirmation in a larger trial of Asian women that appropriately accounts for the habitual intake of soy isoflavones in this population. Nonetheless, it **suggests that a diet rich in soy isoflavones could be an important, cost-effective, and acceptable primary prevention strategy for breast cancer risk** in a region that is currently observing alarming increases in breast cancer incidence.

MOH CPG on Management of Breast Cancer

Non-modifiable and modifiable risk factors

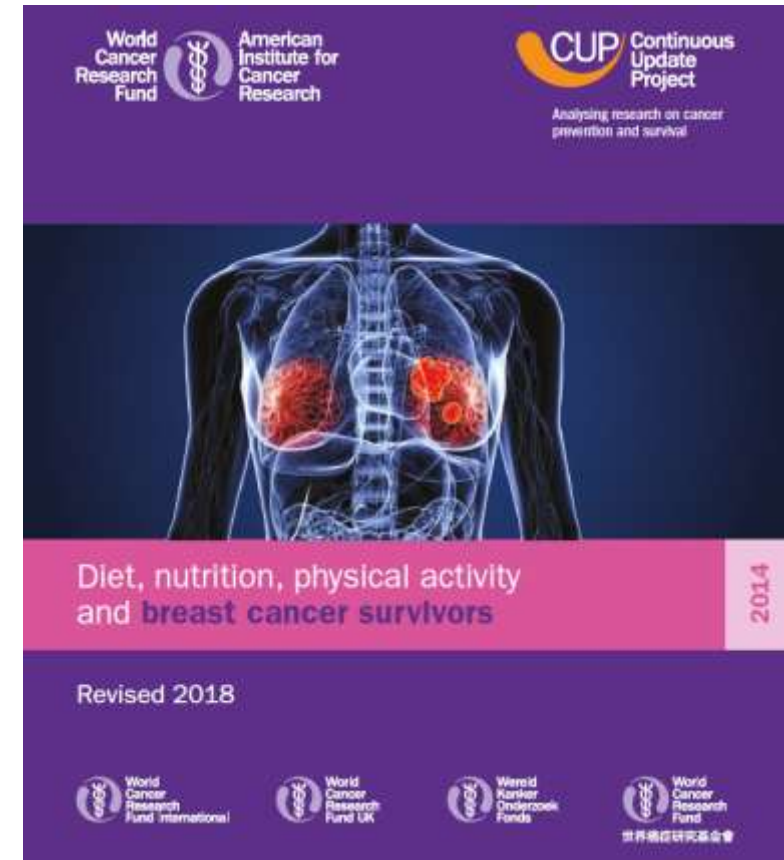
Non-Modifiable Risk Factors	Age	
	Gender	
	Family history	
	Reproductive factors	Puberty/menopause age
	Breast density	
Modifiable Risk Factors	Reproductive factors	No of children, BF
	Hormonal factors	Oral contraceptives, HRT
	Lifestyle	Weight, Exercise, Diet
	Radiation Exposure	

Among pre- and post-menopausal women, **soy isoflavone intake reduces breast cancer risk** with OR of 0.74 (95% CI 0.64 to 0.85) and 0.75 (95% CI 0.63 to 0.86) respectively. [Level of Evidence: II-2]



Is Soya Safe for Cancer Patients?

- In a joint report in 2018, the **American Institute For Cancer Research** and the **World Cancer Research Fund** suggested that there is evidence, although limited, that there was **better survival among women with breast cancer** who:
 - have a healthy body weight,
 - are physically active,
 - eat foods containing dietary fiber,
 - **eat foods containing soy,**
 - or have lower fat or saturated fat intake.



Soy and isoflavones consumption and breast cancer survival and recurrence: a systematic review and meta-analysis

Shumin Qiu¹, Chongmin Jiang²

A total of 12 articles were included

- Among 37,275 women with breast cancer
- Looked at Overall Survival / BC Specific Survival / BC Recurrence

Consumption of Soya Isoflavones @ Pre- & Post-Diagnosis
→ associated with reduced risk of recurrence

Myth #2: Soya feminizes men



Common Misconception

“Men consuming soya will gain estrogen or become feminine.”

Feminization in men ~ erectile dysfunction, increased estrogen levels, loss of libido, gynecomastia and low testosterone

Myth #2: Soya feminizes men

JOURNAL ARTICLE EDITOR'S CHOICE

Effect of Soy in Men With Type 2 Diabetes Mellitus and Subclinical Hypogonadism: A Randomized Controlled Study FREE

Thozhukat Sathyapalan, Alan S. Rigby, Shalender Bhasin, Natalie J. Thatcher, Eric S. Kilpatrick, Stephen L. Atkin [Author Notes](#)

The Journal of Clinical Endocrinology & Metabolism, Volume 102, Issue 2, 1 February 2017, Pages 425–433, <https://doi.org/10.1210/jc.2016-2875>

200 men, 45 - 75 yo

- 15g soy protein w/ 66 mg of isoflavones (SPI),
 - 15 g soy protein w/o isoflavones (SP)
- ~ Snack bars x Daily x 3 months

Findings - SPI vs SP:

- Testosterone levels were **unchanged**
- Substantial improvement in glycaemia & CV risk markers

Review > *Reprod Toxicol.* 2021 Mar;100:60-67. doi: 10.1016/j.reprotox.2020.12.019.

Epub 2020 Dec 28.

Neither soy nor isoflavone intake affects male reproductive hormones: An expanded and updated meta-analysis of clinical studies

Katharine E Reed ¹, Juliana Camargo ², Jill Hamilton-Reeves ³, Mindy Kurzer ⁴, Mark Messina ⁵

38 (out of 141) clinical studies were meta-analyzed

Findings -

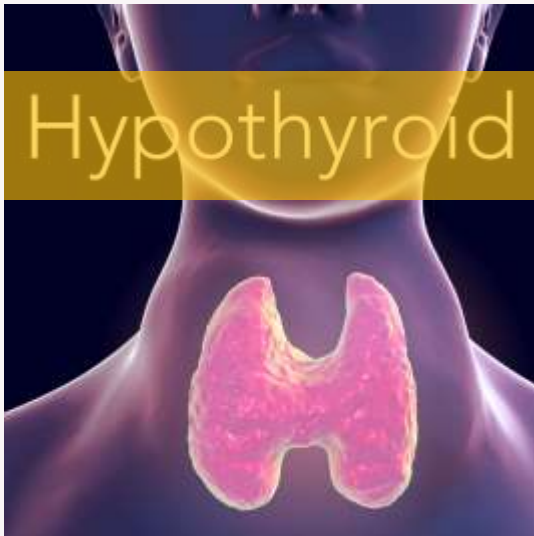
- **No effects** of soy/isoflavones on testosterone or estrogen levels in men were noted

FACT: Soya does not feminize men

Scientific studies show that soya isoflavones:

- Have no feminizing effects in males consuming soya isoflavones
- Do not impact total or free testosterone levels
- Have no effect on sperm or semen parameters

Myth #3: Soya consumption is bad for the thyroid



Affecting Thyroid Function?

→ Concerns that when iodine intake is insufficient, isoflavones could potentially worsen thyroid function?

Myth #3: Soya consumption is bad for the thyroid

Article | [Open access](#) | Published: 08 March 2019

Systematic Review and Meta-analysis on the Effect of Soy on Thyroid Function

[Jemiliat Otun](#) , [Amirhossein Sahebkar](#), [Linda Östlundh](#), [Stephen L. Atkin](#) & [Thozhukat Sathyapalan](#)

Scientific Reports **9**, Article number: 3964 (2019) | [Cite this article](#)


Meta-analysis of 18 clinical trials:

Findings -

- suggests that soya consumption has **no effect on the thyroid hormones levels** of T4 or T3

efsa JOURNAL

OPEN ACCESS

Opinion |  [Open Access](#)

Risk assessment for peri- and post-menopausal women taking food supplements containing isolated isoflavones

EFSA Panel on Food Additives and Nutrient Sources added to Food (ANS)

First published: 21 October 2015 | <https://doi.org/10.2903/j.efsa.2015.4246> | Citations: 75

European Food Safety Authority (EFSA) published it's scientific opinion:

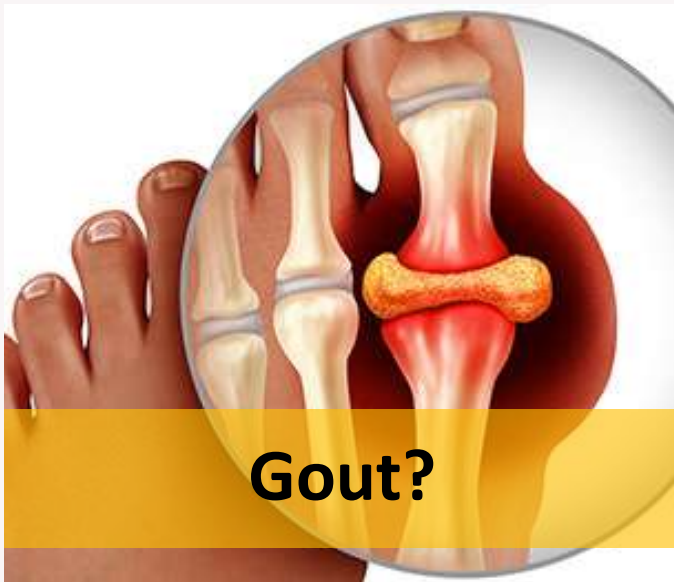
- Concluded **that human data do not indicate any suspected harmful effects** from a potential interaction of isoflavones on endocrine pathways (in mammary gland, uterus and/or thyroid).

FACT: Soya does not interfere thyroid function

Scientific studies show that:

- Euthyroid individuals - **no effects on thyroid function**
- Hypothyroid patients – soya may interfere with the absorption of the meds
 - Not due to effect on the thyroid
 - Soy is not unique in this regard, many other herbs, drugs, fiber and calcium supplements have similar effects

Myth #4: Gout sufferers cannot eat soya food



Common Misconception

“Do not consume soya if you have gout.”

Myth #4: Gout sufferers cannot eat soya food

In 2010, International Life Sciences Institute surveyed 239 healthcare professionals from 3 Asian countries – SG, ID & TH

Even among
Healthcare
Professionals

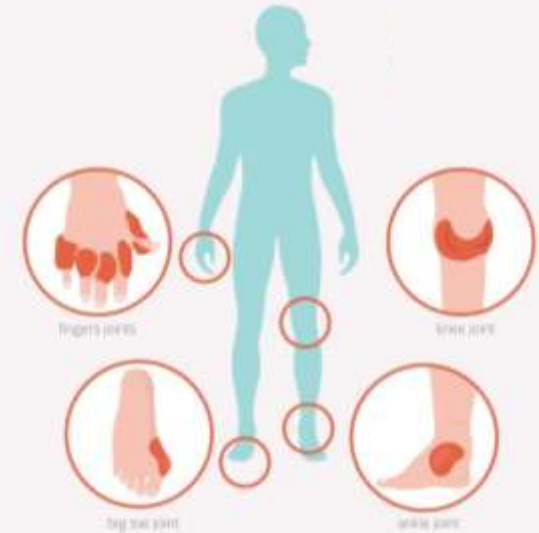
- Found that an overwhelming 48% of the healthcare professionals believed that soya foods should be avoided by gout patients
 - Singapore: 69%
 - Indonesia: 46%
 - Thailand: 27%
- **59% Dietitians/nutritionists**
 - **53% Nurses**
 - **44% Physicians**

Myth #4: Gout sufferers cannot eat soya food

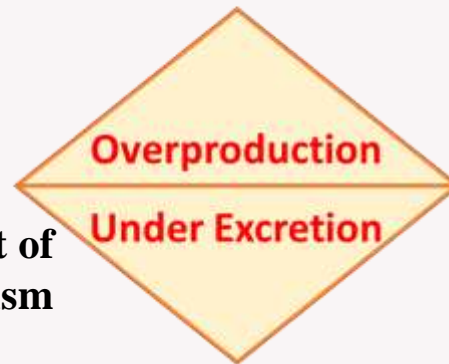
What is gout?

Gout is caused by monosodium urate (MSU) crystal deposition with clinical presentations of gout flare, chronic gouty arthritis or subcutaneous tophus.

- Consequence of hyperuricemia



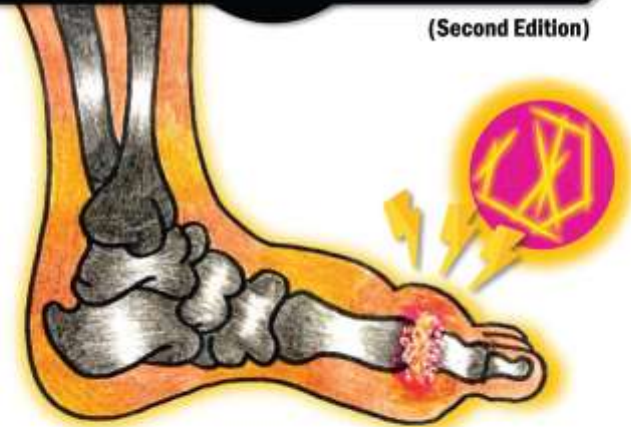
URIC ACID
enzymatic product of
PURINE metabolism



HYPERURICAEMIA

MANAGEMENT OF

GOUT
(Second Edition)



KEY DIETARY RECOMMENDATIONS

Risk Factors and Preventive Strategies

- maintenance of a healthy body weight
- avoidance of alcohol
- adherence to DASH diet:
 - **discourages purine-rich red meat, fructose-rich foods, full-fat dairy products & SFA**
 - encourages vegetables, fruits, whole grains, fat-free/lowfat dairy products, fish, poultry, beans, nuts & vegetable oil

DIETARY RECOMMENDATIONS FOR GOUT

Restriction advised

- Animal-based purine-rich foods

No Restriction

- **Plant-based purine-rich foods - soy-based food and non-soy legumes e.g. peas, beans, lentils**

Myth #4: Gout sufferers cannot eat soya food

> Arthritis Rheumatol. 2015 Jul;67(7):1933-42. doi: 10.1002/art.39115.

Food Sources of Protein and Risk of Incident Gout in the Singapore Chinese Health Study

Gim Gee Teng ¹, An Pan ², Jian-Min Yuan ³, Woon-Puay Koh ⁴

The Singapore Chinese Health Study - involving **>50,000 adults in Singapore** and the largest of its kind in Asia

- ↑ Poultry and fish/shellfish ⇒ ↑ risk of gout;
- ↑ **Soya** ⇒ ↓ **risk of gout**

The finding confirms 6 other studies done in Taiwan (4) and China (2), which showed that eating soya does not increase uric acid retained in the blood.

Myth #4: Gout sufferers cannot eat soya food

> [Front Nutr.](#) 2022 Sep 2;9:975718. doi: 10.3389/fnut.2022.975718. eCollection 2022.

Soy consumption and serum uric acid levels: A systematic review and meta-analysis

Ying Duan¹, Qi Qi¹, Zihao Liu¹, Min Zhang², Huaqing Liu¹

- Soya could be **high-quality protein sources** for individuals with hyperuricemia or gout

FACT: Gout sufferers can consume soya food/milk

Dietary recommendation by the MOH Clinical Practice Guidelines For Management of Gout stated:

- ✓ **NO** restriction required on consumption of soya-based food
- ✓ Plant-based purine-rich foods are **NOT** associated with increased risk of gout

Myth #5: Does Soya contains GMO?

“Genetically modified organism (GMO)” means an organism in which the genetic material has been **changed through modern biotechnology** in a way that it does not occur naturally by multiplication or natural recombination or both.



Why GMO?

To enhance crop traits

- increased yield
- reduced pesticide
- improved nutritional value

GMO safe to eat?

- Available since the 1990s
- Years of research from around the world shows GMO foods are just as safe to eat as non-GMO foods
- GMOs are regulated

GMO vs non-GMO foods

- Held to the same food safety standards

GMO & Allergies

- Do not cause allergies

GMO & Cancer

- GMO crops are not changed in ways that would increase risk of cancer

FACT: Most Soya Milk Do Not Contain GMO

Food Regulations under the Food Act 1983 **requires labelling on the front panel** if:

- ✓ GMO is present in the 3 main ingredients in the ingredient list

But exempted from labelling if

- ✓ GMO is present in not more than 3% of the food ingredients, or
- ✓ the food consisting of a single ingredient.

(Except when the product contains, consists of or produced from GMO if the gene is derived from animal or substance that may cause hypersensitivity)

Summary

1

Soya Protein is **High-Quality Protein**

Protein QUANTITY

- High protein content

Protein QUALITY

- Contains 9 EAA
- Complete Protein
- PDCAAS of 1



Fortified Soya Milk

Best alternative to dairy milk

2

Soya Health Benefits

Lowers Cholesterol

Reduces Breast Cancer Risks



**Soya Protein
Soya Isoflavones**

3

Soya Myths

Soya does NOT:

- ❖ feminize men
- ❖ cause gout
- ❖ affect thyroid fx
- ❖ mean GMO



More Food Options



Thank you!

E-mail:

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