

# Selecting commercial supplements: Do's and Don'ts

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# Outline

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Understanding hierarchy of scientific evidence for safety and efficacy of supplements

Commercial supplements

Selection of commercial supplements

Case 1: Protein supplements

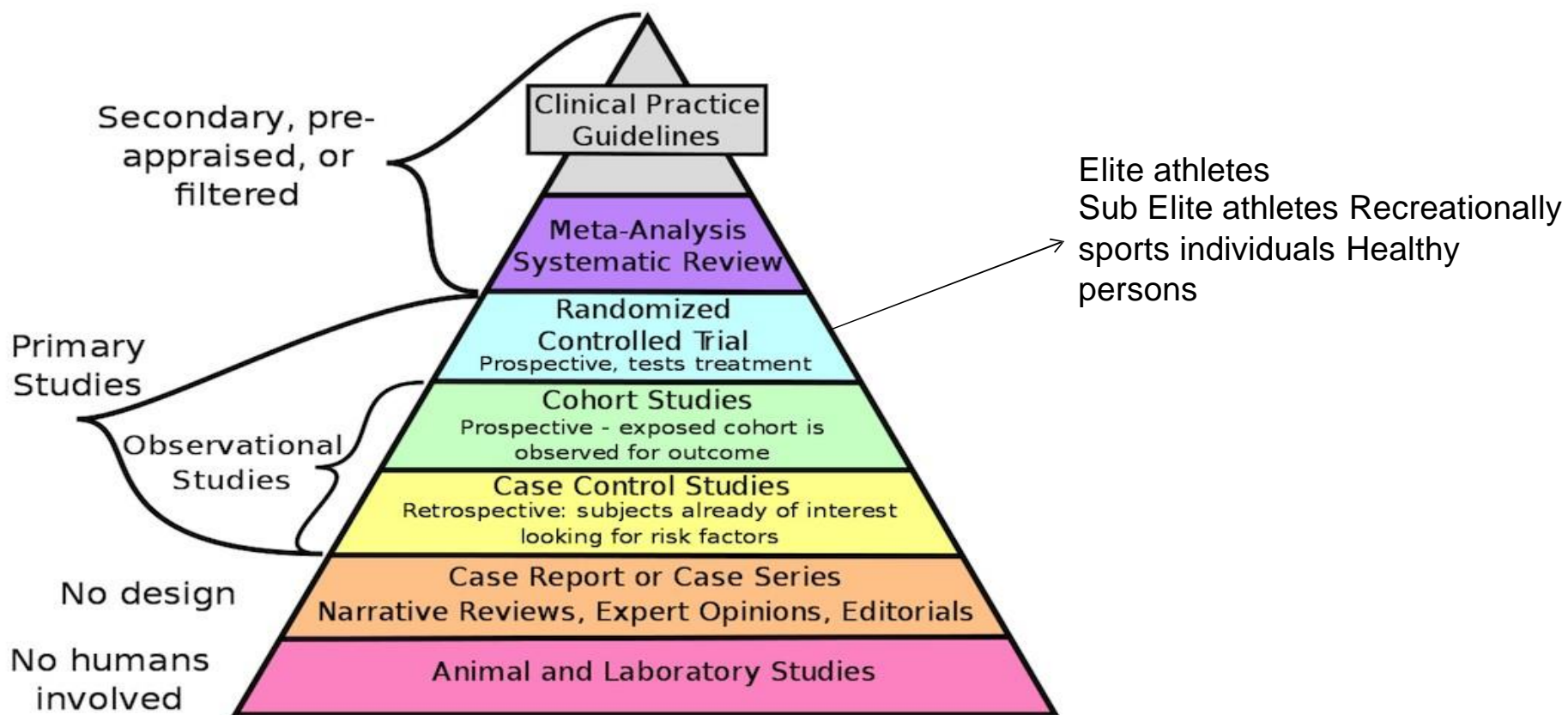
Case 2: Pre workout

Case 3: Fat burner

Case 4: Herbal supplements

Key Points

# Hierarchy of Scientific Evidence



Source: <https://www.jmir.org/2019/3/e10769/>

## Animal Studies

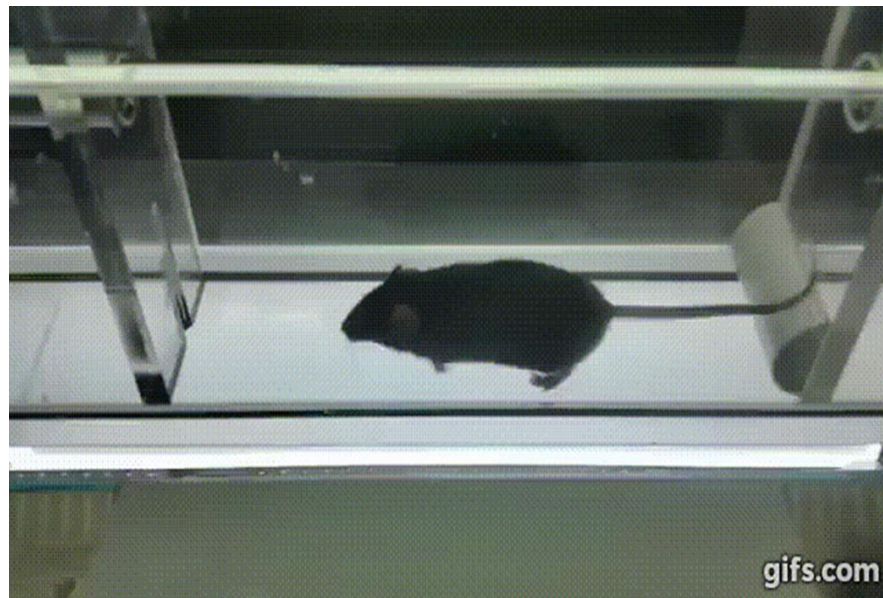
Primary focus on:

Establishing probable mechanism of action

Safety during acute and chronic consumption

Doses for safe consumption

Initial efficacy



# Randomized control Trials

Specific population

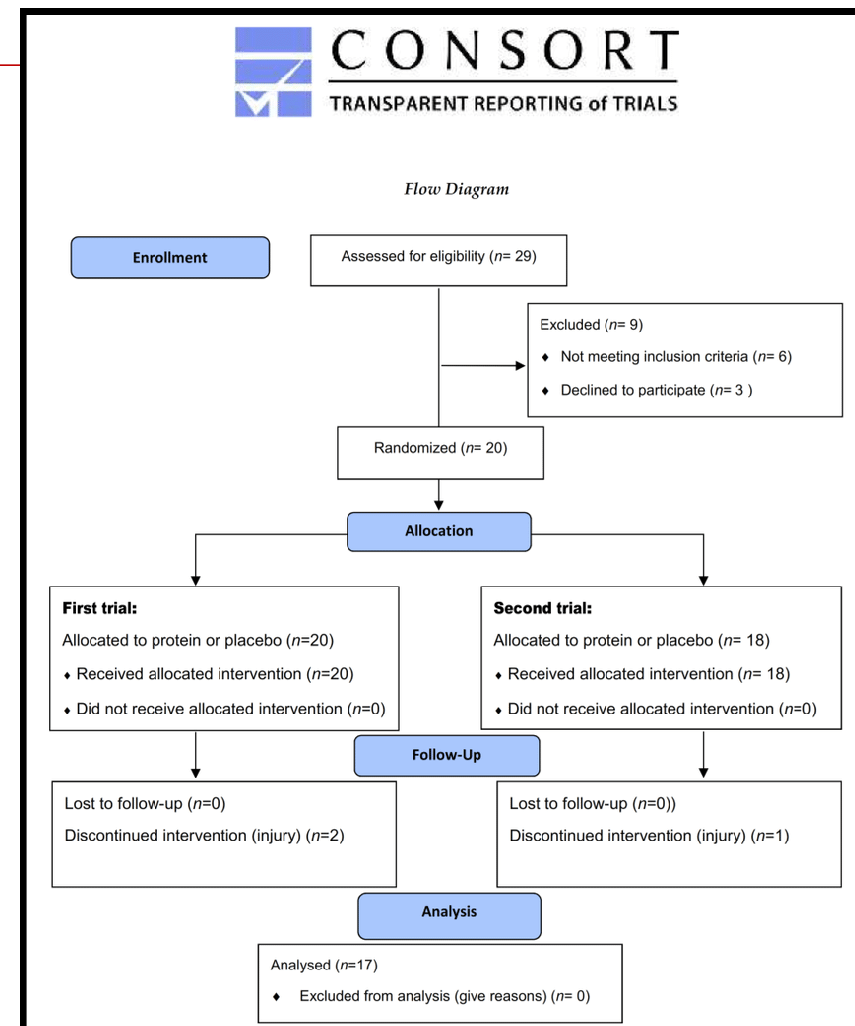
Controlled conditions

Equal opportunity- Randomization

Standard outcome measure

Set protocols, ethics

One RCT can not extrapolate results to whole population



# Meta analysis and Systemic reviews

A *systematic review* answers a *defined* research question by collecting and summarising all empirical evidence that fits pre-specified eligibility criteria.

A meta-analysis is the use of statistical methods to summarise the results of these studies.



## Efficacy and Safety of Whey Protein Supplements on Vital Sign and Physical Performance Among Athletes: A Network Meta-Analysis

Ful-Ching Lam<sup>1</sup>, Allah Bukhsh<sup>1,2</sup>, Habib Rehman<sup>3</sup>, Muhammad Khurram Waqas<sup>2</sup>, Nabeel Shahid<sup>2</sup>, Adil Mohammed Khalil<sup>4</sup>, Ahlam Eihanish<sup>4</sup>, Mustafa Karoud<sup>2</sup>, Ahmed Talb<sup>5</sup> and Tahir Mehmood Khan<sup>1,2\*</sup>

# Practice guidelines in Sports Nutrition

**International Olympic committee**

**Australian Institute of Sports**

**American college of Sports 'Medicine**

**Federations of specific sports**

*International Journal of Sport Nutrition and Exercise Metabolism*, 2018, 28, 104-125  
<https://doi.org/10.1123/ijsem.2018-0020>  
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Human Kinetics   
CONSENSUS STATEMENT

## **IOC Consensus Statement: Dietary Supplements and the High-Performance Athlete**

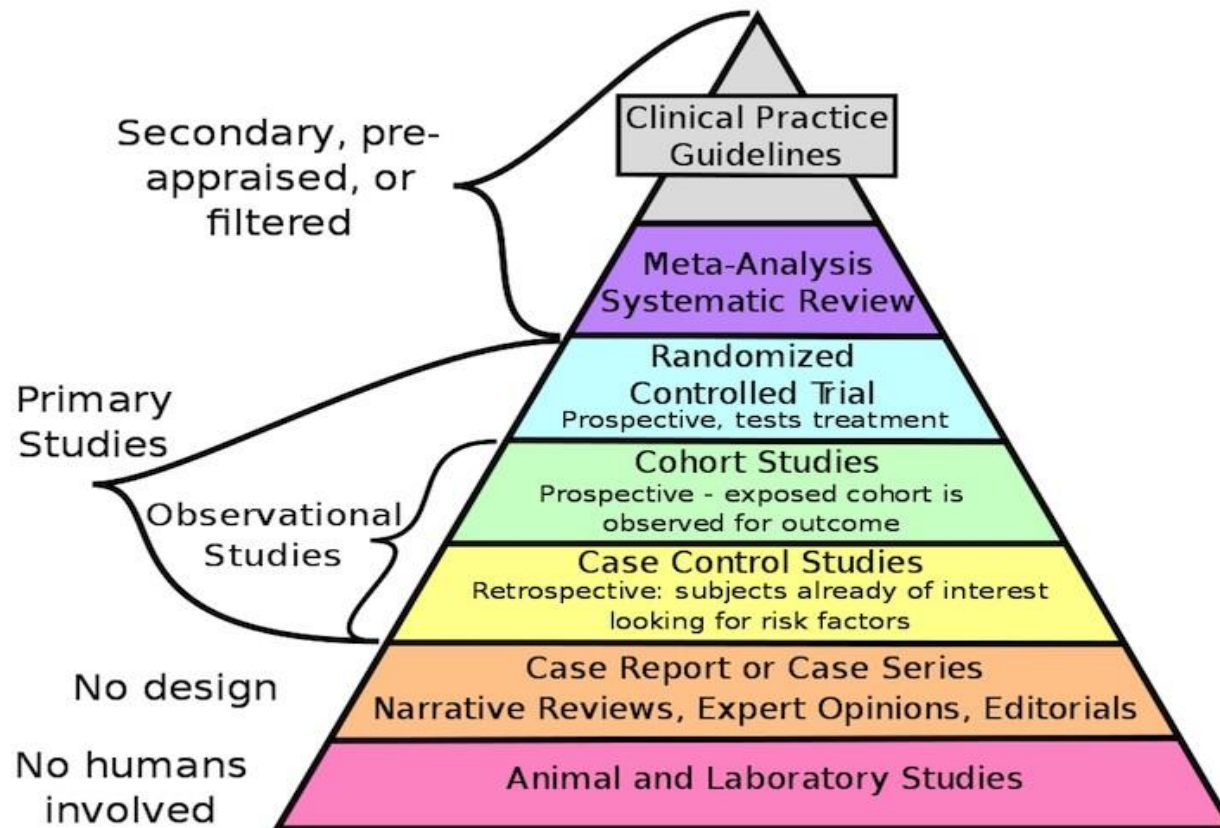
**Ronald J. Maughan**  
St Andrews University

**Louise M. Burke**  
Australian Institute of Sport and  
Mary MacKillop Institute  
for Health Research

**Jiri Dvorak**  
Schulthess Clinic



# Vaccine for corona virus



Source: <https://www.jmir.org/2019/3/e10769/>



## Commercial supplements

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Evidence based to a certain extent- For Isolated pure forms of substances for which have been found to effective and safe.

Promotes multi ingredient supplements

May Extrapolates animal studies

May use Low quality randomized control trials as scientific evidence

Less stringent control of regulating authorities in comparison to Pharma industry

Profit based

# Selection of supplements: Case 1

Identifying issue

- Increasing protein intake | Role of diet ??

Choosing the supplement

- Protein/ amino acid supplements
  - Concentrate/ Isolate/ Hydrolysate
  - Whey, Soy, Vegan, Egg
- | Availability of doctor/  
nutritionist ??

Identifying some leading brand

- Dope free | Third party certification??

Asked for supplement from the dealer (For eg. Whey protein)

5-6 protein supplements of whey protein of same brand

**What to choose??**

## **Which has highest performance effect....**

**How to determine performance effect??**

**Clinical studies??**

**Brand introduced new product so will be more effective??**

**More expensive, more effective??**

**The dealer or some other person said so??**

# Standard 100 % Whey Protein

| Amount Per Serving |           | % DV |
|--------------------|-----------|------|
| Calories           | 130.00    |      |
| Calories from Fat  | 20.00     |      |
| Total Fat          | 2.00 g    | 3%   |
| Saturated Fat      | 1.00 g    | 5%   |
| Trans Fat          | 0.00 g    |      |
| Cholesterol        | 65.00 mg  | 22%  |
| Sodium             | 60.00 mg  | 3%   |
| Total Carbohydrate | 5.00 g    | 2%   |
| Dietary Fiber      | 0.00 g    | 0%   |
| Potassium          | 200.00 mg | 6%   |
| Sugars             | 2.00 g    |      |
| Protein            | 24.00 g   | 0%   |
| Vitamin A          | 0.00      | 0%   |
| Vitamin A          | 0.00      | 0%   |
| Calcium            | 0.00      | 13%  |
| Calcium            | 0.00      | 13%  |
| Vitamin C          | 0.00      | 0%   |
| Vitamin C          | 0.00      | 0%   |
| Iron               | 0.00      | 1%   |
| Iron               | 0.00      | 1%   |

## Specialized whey protein claimed by same brand

| Amount Per Serving  |         | % DV |
|---|---------|------|
| Calories  | 200     |      |
| Total Fat   | 1.5g    | 2%   |
| Saturated Fat   | 1g      | 5%   |
| Cholesterol   | 20mg    | 7%   |
| Total Carbohydrate  | 8g      | 3%   |
| Dietary Fiber   | 1g      | 4%   |
| Total Sugars  | 2g      |      |
| Protein   | 40g     | 80%  |
| Calcium   | 200 mg  | 15%  |
| Sodium  | 260 mg  | 11%  |
| Potassium   | 300 mg  | 6%   |
| Iron  | 1.2 mg  | 7%   |
| Chromium  | 500 mcg | **   |
|   | 22.4 g  | **   |
| BCAA &  |         | **   |
| Glutamic Acid and Glutamine (from Whey Protein Isolate,<br>Hydrolyzed Whey Protein) |         | **   |
| ***** Complex   |         | **   |
| ***** Enzyme Blend  |         | **   |
| ***** Matrix  | 4.05 g  | **   |

- 40g of fast-digesting protein with whey hydrolysates, whey isolate and 10g of leucine helps improve strength and post-training anabolic response\*
- Enhanced complex with a premium BCAA ratio for muscle growth and recovery
- \*\*\*\*\* enzyme complex help accelerate muscle protein synthesis and absorption of amino acids
- \*\*\*\*\*Matrix ingredients include Testoboosters and creatine to support testosterone levels and enhanced power
- Clinically-proven protein support for increased muscle size and a 30% increase in muscle strength in just 8 weeks\*

### Study 1

8-week Randomized, double-blind, placebo-controlled study 33 **healthy men**

Supplement vs. an isocaloric carbohydrate placebo

Consumed before and after resistance training.

**Greater increases in muscle strength** than those on the placebo.

Increased muscle cross-sectional area from baseline.

### Study 2

When used in conjunction with an exercise program.

8-week Randomized, double-blind, placebo-controlled study

30 **healthy male volunteers**

comparing 1 set resistance training (RT) + **Supplement or carbohydrate placebo** to 2 sets RT alone with no supplement,

Supplement group showed **equal gains** in maximal muscle strength and muscle endurance compared to the control group.

### Study 3

Randomized, double-blind crossover clinical trial

20 **recreationally trained, healthy male** subjects,

10g whey protein isolate plus 10g leucine immediately post-workout

**Significant increases in key protein (p70S6k & rpS6)** associated with muscle protein synthesis.

**Sub Elite/  
Elite  
Athletes ???**



What you had decided  
to use

Whey protein  
Isolates

With third party  
certification

Gap: Did not read the label and selected  
fancy marketed product

What you end up with

Whey protein  
Isolates, hydrolysate  
mixture

Some enzymes blends  
Testo boosters  
Creatine

Expensive

Low health safety

## Yes we need supplement with highest effect.... BUT

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**Don't** purchase a supplement just because it is the latest one introduced by a very reputed brand or because you are travelling foreign lands and that product is not available in India.

**Do** purchase generic protein concentrate, isolates, hydrolysates without any fancy names like ripped, amplified, explosive, extreme etc.

## Selection of supplements: Case 2

50 Kg Boxer

Identifying issue

Feels lethargic before and during training

Have brief knowledge regarding performance enhancing supplements like caffeine, creatine, beta alanine etc.

Selection of supplement

Heard about some good pre workouts with caffeine, creatine, beta alanine

Identified some leading brand

Dope free

Third party certification??

Role of diet ??

Training load??

Psychological issues??

Other recovery methods like sleep, massage etc.

Biochemical tests??

Nutritional deficiencies??

Availability of nutritionist/doctor

## Supplement Label

|  |         |
|--|---------|
| Serving Size 1 Servings                |         |
| Servings Per Container 30              |         |
| Amount Per Serving                     |         |
| Vitamin B12                            | 100 mcg |
| Sodium                                 | 100 mg  |
| Citrulline Malate                      | 6000 mg |
| Beta Alanine                           | 3200 mg |
| Caffeine Anhydrous                     | 333 mg  |
| Taurine                                | 100 mg  |
| Huperzine A (Huperzia serrata) Extract | 50 mg   |
| Deer Antler Velvet Extract             | 50 mg   |
| ***** Herb Complex                     | 25 mg   |
| ***** Herb Complex                     | 25 mg   |
| ** Daily Value (DV) not established.   |         |

\*\*\*\*\* **Herb complex**

\*\*\*\*\* Herb complex is a natural compound composed of highly fractionated Astragalus and Panax Notoginseng.

12 different in-vivo and in-vitro studies,  
Significantly improve the absorption of critical nutrients including Amino acids  
Vitamins absorption  
Glucosamine absorption  
ATP production

No reference or link to 12 studies quoted

Could not find proper information on \*\*\*\*\* Complex 2

## What you had decided to use

Some good pre work out with caffeine, beta alanine probably

Gap: Did not read the label and selected fancy marketed product

## What you end up with

High levels of caffeine for certain weight categories

Some patented herb mixtures with no specific details

Expensive than genetic caffeine, beta alanine

Low health safety

## Worst case scenario....

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- The boxer was having iron deficiency due to which he felt lethargy
- He sidelined blood testing, consultation with doctor/nutritionist
- Started with pre workout
- The caffeine intake in such condition may significantly impair the iron absorption and thus aggravate the condition.



## Pre workouts

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Most of the pre workouts are a combination of stimulants, herbs, amino acids, minerals, vitamins etc. in large variations with added proprietary blends.

What is not established:

- The specific doses as per scientific evidence
- Actual effect when used in combinations
- Safety and efficacy on long term use
- Can not identify the side effect of a particular ingredient

Increases the risk of contamination of dope substances if not third party certified

## Pre workouts are no magic wands...

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**Don't** use pre workout supplements if you can not determine the actual content and doses of different substances present in pre/post workout or have not consulted with doctor/ nutritionist.

**Do** look for generic pure form specific performance enhancement supplements like Beta alanine, creatine, caffeine, Bi carbonate, Nitrates vitamins, minerals etc.

## **Selection of supplements: Case 3**

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### **Influence of peers or others**

Two boxers training together

Boxer one is taking particular fat burner supplement and feeling better recovery post training

He suggests the same to boxer two.

Boxer two taking only one pre workout supplement (discussed in case 2) and excited and willing to take the fat burner.

## Fat burner recommended by boxer One

The fat burner predominantly contains caffeine

Boxer two is already taking pre workout containing caffeine

Can lead to side effects related to caffeine ingestion

| <b>Supplement Facts</b>  |               |      |
|--|---------------|------|
| Serving Size Three Tablets   |               |      |
| Servings Per Container 30  |               |      |
| Amount Per Serving   | % Daily Value |      |
| Vitamin C (as Ascorbic Acid)   | 120 mg        | 200% |
| Niacin   | 20 mg         | 100% |
| Vitamin B-6 (as Pyridoxine Hydrochloride)  | 2 mg          | 100% |
| Pantothenic Acid (as Calcium d-Pantothenate)   | 10 mg         | 100% |
| Ginger Root Extract ( <i>Zingiber officinale</i> )(5% Gingerols = 25mg)  | 500 mg        | *    |
| Yerba Mate Extract ( <i>Ilex paraguariensis</i> )(8% Caffeine = 40mg)  | 500 mg        | *    |
| Guarana Seed Extract ( <i>Paullinia cupana</i> )(36% Caffeine = 152mg)   | 422 mg        | *    |
| Proprietary Thermogenic Blend  | 238.34 mg     | *    |
| Caffeine Anhydrous, Capsimax™ Capsicum Fruit Extract, Bioperine® Black Pepper Extract  |               |      |
| Pre-Workout Xplosion Blend   | 100 mg        | *    |
| Green Tea Leaves Extract ( <i>Camellia sinensis</i> )(8% Caffeine = 2mg), Yohimbe Bark Extract ( <i>Pausinystalia yohimba</i> )(2% Yohimbine = 1 mg), GABA (gamma-Aminobutyric Acid) |               |      |
| Black Tea Leaves Extract ( <i>Camellia sinensis</i> ) (10% Caffeine = 10mg)(Polyphenols = 60mg)  | 100 mg        | *    |
| Schisandra <i>chinensis</i> Fruit Extract  | 100 mg        | *    |
| Micronized L-Carnitine   | 25 mg         | *    |
| Dill Weed Extract ( <i>Anethum graveolens</i> )  | 5 mg          | *    |
| Grape Seed Extract ( <i>Vitis vinifera</i> )   | 1 mg          | *    |

\* Daily Value not established.

What boxer two had  
decided to use

Some fat burner  
supplement

Gap: Did not read the label and selected  
fancy marketed product

What you end up with

High intake of caffeine

Some herb mixtures

Expensive than generic  
caffeine and  
polyphenols

Low health safety

Second major content  
is Ginger Root extract-  
SAUNTH??

**Don't** add any supplement in plan without comparing it with ongoing supplement, sometimes you may take higher doses of certain substance if present in both the supplements.

**Do** always look for label of the supplements you have chosen or others have chosen for you.

# Comparing pre-workout of case 2 and fat burner of case 3

## PRE WORKOUT

Caffeine

Beta Alanine

Citrulline

Some patented herb mixtures with no specific details

Some Vitamins

## FAT BURNER

Caffeine

Ginger root powder

Some herb mixtures

Some Vitamins

General composition of fat burners  
Caffeine, L-Carnitine, Herbal extracts, fruit extracts



# Scientific evidence for supplements to reduce weight

## Losing fat mass\*\*

|   |  |   |
|---|--|---|
| Protein<br>From increased dietary sources or supplemental isolated proteins | Enhance fat mass loss and promotes retention of lean mass  | Meta-analyses confirm small but significant effects of greater dietary protein in weight loss to enhance fat mass loss and promote lean mass retention (Krieger et al., 2006; Wycherley et al., 2012) |
| Pyruvate  | No data  | Small-to-trivial effect (Onakpoya et al., 2014a)  |
| Chromium  | Potentiates biological actions of insulin  | No effect (Tian et al., 2013)   |
| Green tea (polyphenol catechins and caffeine)                               | Thermogenic agent and/or lipolytic-enhancing agent   | Small-to-trivial effect (Jurgens et al., 2012)  |
| α-Lipoic acid   | No clear role, but possible antioxidant  | Small-to-trivial effect (Kucukgoncu et al., 2017)   |
| Conjugated linoleic acid (CLA)  | Changes membrane fluidity favoring enhanced fat oxidation  | Small-to-trivial effect (Onakpoya et al., 2012)   |
| Konjac fiber (glucomannan)  | Water-soluble polysaccharide—dietary fiber   | Small-to-trivial effect (Onakpoya et al., 2014b)  |
| Omega-3 polyunsaturated fatty acids   | No clear role, but possible appetite suppression, improved blood flow, and/or modulator of gene expression | Small-to-trivial effect (Zhang et al., 2017)  |
| Chitosan  | Lipid-binding agent to reduce lipid absorption   | Small-to-trivial effect (Jull et al., 2008)   |

\*In combination with progressive resistance exercise programs. \*\*In combination with an exercise- and/or diet-induced energy deficit.

Source: Maughan et al, 2018

## Selection of supplements: Case 4

Identifying Issue:

- Not able to recover properly
- Inclination towards herbal supplements

Selection of supplement

Role of diet ??  
Training load??  
Psychological issues??  
Other recovery methods like sleep,  
massage etc.

Biochemical tests??  
Nutritional deficiencies??  
Availability of nutritionist/doctor

# Herbal Supplements

Hypothesized Mechanism of action:

- Immuno-modulators
- Anti inflammatory
- Boost some hormones like Testosterone, Insulin like growth factors
- No sufficient evidence of efficacy
- High risk of contamination of Banned substances



# Ginseng



CrossMark  
click for updates

**ORIGINAL ARTICLE**

Pharmacology, Drug Therapy & Toxicology

**JKMS**

<https://doi.org/10.3346/jkms.2016.31.12.1879> • *J Korean Med Sci* 2016; 31: 1879-1886

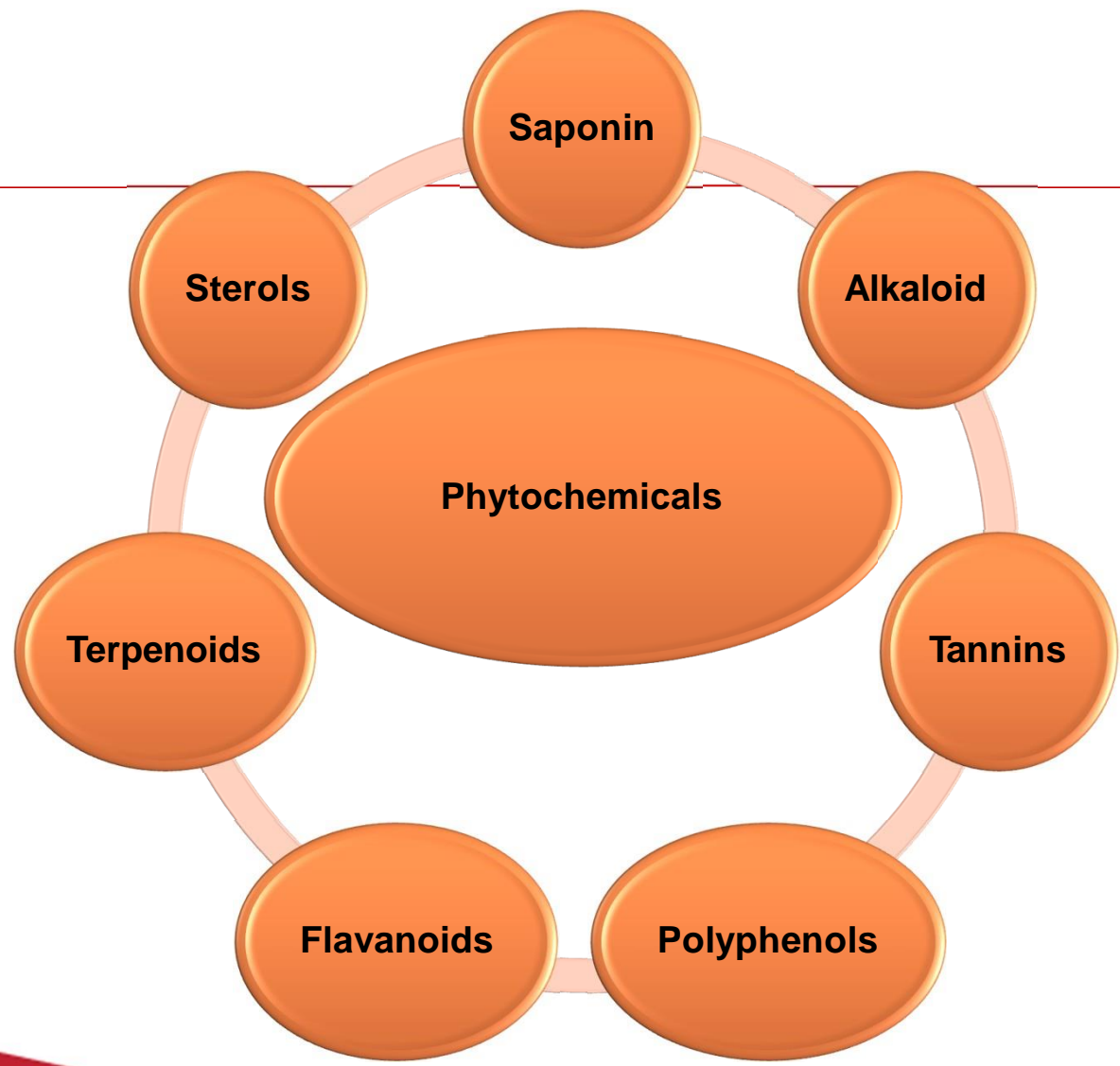
## Efficacy of Ginseng Supplements on Fatigue and Physical Performance: A Meta-analysis



Insufficient clinical evidence to support the use of ginseng supplements on reducing fatigue and enhancing physical performance.

## Some common herbal supplements and their active ingredients

| Herbal Supplement         | Active component  |
|---------------------------|---|
| <b>Ginseng</b>            | Saponins and gGucosides like Ginsenosides Eleutherosides and Ciwujianosides           |
| <b>Guarana</b>            | Alkaloids: Caffeine, Theophylline, Theobromine, Tannins and Saponins                  |
| <b>TribulusTerrestris</b> | Saponins like Dioscine, Diosgenin, and the Protodioscin PhytosterolsBeta-Sistosterols |
| <b>Rhodiola Rosea</b>     | Rosine Rosarines, Rosin, Tyrosol, Rosiridin, Tannins and Polyphenols                  |
| <b>Codyceps Sinensis</b>  | Stearic Acid, D-Mannitol, Mycose, Ergosterol, Uracil, Adrenine                        |
| <b>Ginkgo biloba</b>      | Flavonoids and Terpenoids   |
| <b>Astragalus</b>         | Saponins and Polysaccharides  |
| <b>Shilajit</b>           | Fulvic acid, triterpenes, sterols, amino acids, polyphenols, and phenolic lipids      |



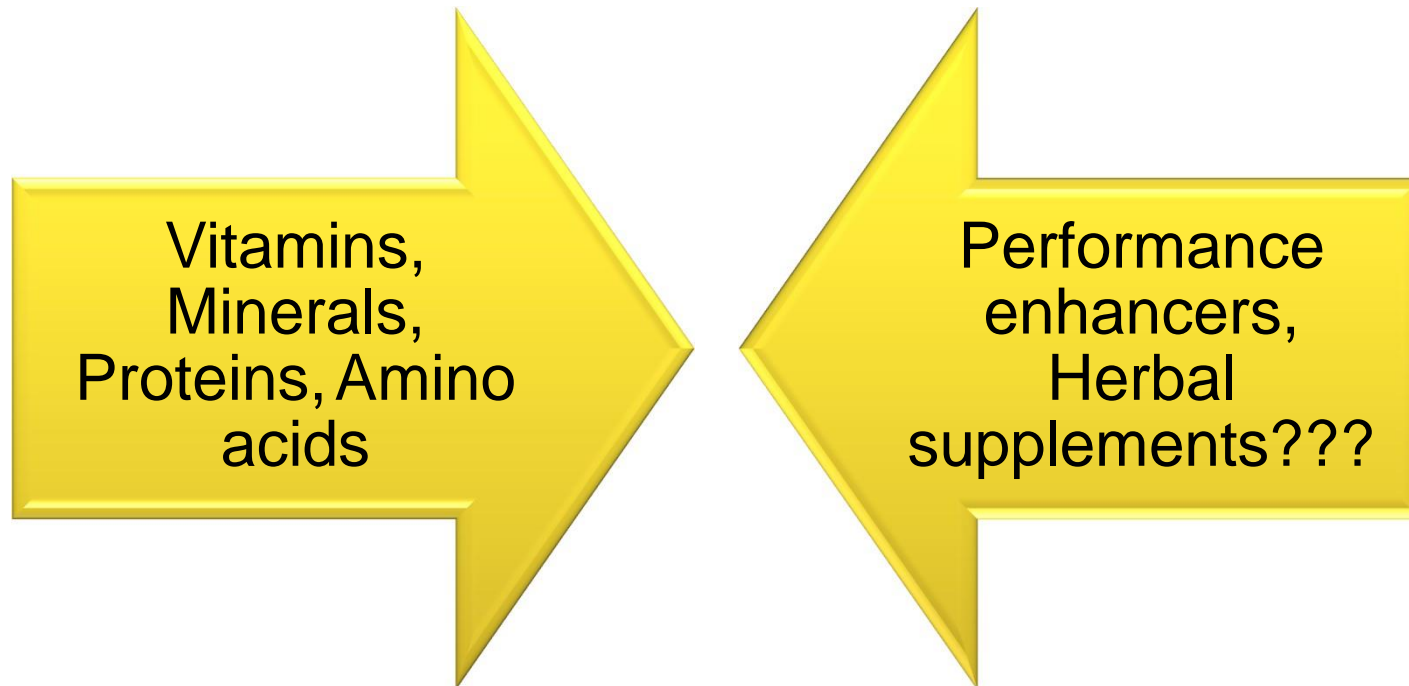
## Most Commonly Studied Phytochemicals

| Food   | Phytochemical(s)                                    |
|--|---|
| Citrus fruits<br>(oranges, lemons, grapefruit)   | Monoterpenes (limonene)- Terpenoid<br>Carotenoids   |
| Other fruits (grapes, berries,<br>cherries, apples, watermelon, pomegranate)                                   | Ellagic acid<br>Phenols<br>Flavonoids (quercetin)   |
| Beans, grains, seeds<br>(soybeans, oats, barley, brown<br>rice, whole wheat, flax seed)<br>Protease inhibitors | Flavonoids (isoflavones)<br>Phytic acid<br>Saponins |
| Herbs, spices (ginger, mint,<br>rosemary, thyme, oregano,<br>basil, tumeric,<br>fennel)                        | Gingerols<br>Flavonoids<br>Monoterpenes (limonene)  |
| Green tea<br>Polyphenols   | Glycyrrhizin Catechins- Polyphenols                 |



| Food   | Phytochemical(s)   |
|--|--|
| Allium vegetables<br>(garlic, onions)                                      | Allyl sulfides   |
| Cruciferous vegetables<br>(broccoli, cauliflower,<br>cabbage,<br>turnips,) | Indoles/glucosinolates<br>Sulfaforaphane<br>Isothiocyanates/thiocyanates<br>Thiols |
| Solanaceous vegetables<br>(tomatoes, peppers)                              | Lycopene   |
| Umbelliferous vegetables<br>(carrots,)                                     | Carotenoids<br>Phthalides<br>Polyacetylenes  |

## Placebo effect



## To summarize...

- Always look for scientific evidence based supplements.
- Consult with doctor/nutritionist if available.
- Look for third party certification to decrease the risk of presence of prohibited substances.
- Purchase from certified dealer. Avoid purchasing supplements online.
- Note the batch number of supplement and keep the bill safe.
- While purchasing supplements go for isolated pure substances rather than selecting multi ingredient supplements.
- Do check labels of your ongoing supplements before adding another one to the schedule to avoid duplication of certain ingredients.
- Most of the herbal supplements have no scientific evidence of performance enhancement.
- Once you start one supplement monitor its effects on your recovery, performance using rating scales.



**Bananacep**

A state of physical  
eliteness gained from  
the consumption  
of bananas.

**NO ONE EVER TESTED POSITIVE TO A BANANA**

# FOOD FIRST

**REAL FOOD. REAL BENEFITS. NO RISK.**

RESEARCH SHOWS THAT 1 IN 5 SUPPLEMENTS SOLD IN AUSTRALIA CONTAIN A BANNED  
SUBSTANCE NOT LISTED ON THE INGREDIENT LABEL. WHY RISK A BAN OF UP TO FOUR YEARS?

 **DOWNLOAD THE ASADA CLEAN SPORT APP TO  
REDUCE YOUR RISK OF TESTING POSITIVE FROM  
A SUPPLEMENT OR MEDICATION**



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# Thank You