FITNESS & EXERCISE

What Is Really in Your Pre-Workout?

The front promises a better session; the ingredient list reveals what the evidence can actually support and where uncertainty begins.

The promise is bigger than the category

You are standing in the changing room with a shaker, a brightly marketed powder and the hope that today's workout will feel sharper. "Pre-workout" sounds like a single, recognisable thing. It is not. The words on the front do not tell you which ingredients are inside, how closely the product resembles anything studied, or whether the mixture is likely to help you.

These powders sit within the much broader category of dietary supplements: products taken by mouth to supplement the diet. Supplements can contain vitamins, minerals, herbs and other botanicals, amino acids, enzymes or extracts. They can arrive as powders and drinks as well as tablets, capsules and bars. That breadth is your first clue that two pre-workouts may have little in common beyond the timing suggested by their names.

The evidence varies just as widely. Some ingredients have been studied in athletes; others have very little research behind them. Even when a particular ingredient has promising evidence, the product on a shop shelf or website may differ in important ways from the version used in a research study. A result for one preparation does not automatically belong to every powder that mentions the same ingredient.

There is another distinction worth holding onto. Supplements do not go through the testing required of drugs, and the rules governing their manufacture and distribution are less strict. The U.S. Food and Drug Administration (FDA) is not authorised to review dietary supplements for safety and effectiveness before they reach the market. A confident label is marketing, not pre-market proof.

A tub can contain several different ideas

Look across the research and the familiar cast begins to appear: caffeine, creatine, protein, carbohydrates, electrolytes, nitrate-rich beetroot, sodium bicarbonate and, in some products, herbal ingredients such as yohimbine. A 2025 systematic review of physically active women also examined caffeine, nitric oxide precursors, beta-alanine, proteins, carbohydrates and micronutrients used when a deficiency was present.

These ingredients are not interchangeable. Some are studied for performance during exercise, some for the period between matches, and some as part of meeting ordinary nutritional needs. Putting several into one powder does not turn them into one evidence-based intervention. It makes a blend whose value depends on what is present, how much evidence each component has and whether that combination resembles the one researchers examined.

The same point applies to ingredients that look more like food. A 2023 systematic review of elite soccer players included carbohydrate-and-electrolyte drinks, protein, tart cherry juice and nitrate-rich beetroot concentrate. Carbohydrate-and-electrolyte drinks could help players meet carbohydrate intake strategies during training and match days, but did not improve performance when used alone. Protein appeared more useful between matches, particularly when food intake did not meet recommendations.

That leaves an awkward but useful question: are you buying a pre-workout effect, support for recovery or a convenient way to consume nutrients? The front of the tub may blur those jobs together. The research does not. Reading ingredient by ingredient is slower, but it prevents one supported component from lending an undeserved glow to everything else in the mixture.

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The better-known ingredients have limits

Caffeine and creatine have some of the clearer findings in the supplied evidence, although neither comes with a universal promise. In the review of 18 studies involving elite soccer players, caffeine may have improved jump height and sprint ability, particularly among female players. Responses varied between individuals. Creatine may have helped sprint and agility performance and, among female players, jumping performance.

The 2025 review reached a cautiously positive conclusion for several supplements used by female athletes and other physically active women. Caffeine, nitric oxide precursors, beta-alanine and certain sports-food supplements may positively influence performance or health. "May" is doing important work there. The review included 71 studies, but judged the overall risk of bias moderate because of problems including limited dietary control, inadequate blinding and incomplete handling of menstrual-cycle phase.

A few ingredients may be more relevant after demanding exercise than before it. The soccer review found that tart cherry juice might help maintain performance after matches involving greater force loss and exercise-related muscle damage. Nitrate-rich beetroot concentrate may reduce the decline in performance in the days after matches. Those findings do not establish that either ingredient will improve the workout you are about to begin.

Other claims are shakier. The soccer evidence did not support yohimbine for improving athletic performance. Sodium bicarbonate could not be judged cleanly because study protocols combined it with other substances, so the reviewers called for research on it alone. A proprietary blend examined in the review was not supported either. Sometimes the honest reading of an ingredient list is not "yes" or "no," but "this particular question has not been isolated well enough."

The research is narrower than the packaging

A study population matters. Evidence from elite soccer players tells you about highly trained people completing the particular tests used in those studies. It cannot quietly become proof for every person, every sport or every gym session. The female-athlete review was broader, but its participants ranged from competitive athletes to recreationally active women, and the authors still identified important weaknesses in the underlying studies.

The research also does not show that more ingredients mean more benefit. In fact, blends make attribution harder: if several substances are supplied together, you may not be able to tell which one produced an effect. That was precisely the problem with the sodium bicarbonate protocols in elite players. A long ingredient list can create the appearance of thoroughness while making the evidence less precise.

Food intake remains part of the picture presented by both reviews. Higher-carbohydrate diets helped performance in activities that depleted muscle glycogen, while protein supplements appeared especially relevant when protein from food was below recommendations. Micronutrient supplements were discussed in the context of deficiencies. A powder may be convenient, but the supplied evidence does not support treating every listed nutrient as an automatic performance gap.

Nor can the label settle everything. What is printed on a supplement may not be what the product contains. Some products marketed for bodybuilding, weight loss or sexual enhancement have been found to contain undeclared ingredients, including prescription drugs that are not permitted in supplements. That does not mean every pre-workout is adulterated. It means the label is essential information, not an absolute guarantee.

Monday's job is a label check

Before your next workout, turn the container around. Use the product label and a written list of any medicines and other supplements you take. Write down every active ingredient rather

than judging the powder by its product name, front-of-pack claims or the sheer length of the blend.

Sort those ingredients mentally into three groups: those with some evidence relevant to your kind of activity, those studied mainly for recovery or nutritional needs, and those for which the evidence here is unsupported or uncertain. Caffeine and creatine have some performance findings. Protein, carbohydrates and electrolytes may address particular nutritional circumstances. Yohimbine is not supported by the elite-soccer review, while some combined formulas are too difficult to interpret cleanly.

Do not take more than the label recommends. Supplements can interact with medicines and may create additional risks if you have certain medical conditions or are preparing for surgery. Many have not been tested in pregnant women, nursing mothers or children. If any of those situations applies to you, this has stopped being a shopping decision: take the product label and your medication list to a healthcare professional before using it.

That is the useful test for the coming week. You do not need to decode every promise in the supplement aisle. You need the container, its ingredient label and your medication list. If you cannot identify what the ingredients are meant to do-or whether the product suits your health circumstances-you have found the uncertainty before swallowing it.

Where this comes from

- Dietary Supplements

  MedlinePlus, U.S. National Library of Medicine · https://medlineplus.gov/dietarysupplements.html
- Dietary and Herbal Supplements

  National Center for Complementary and Integrative Health · https://www.nccih.nih.gov/health/dietary-and-herbal-supplements
- Effects of dietary supplements on athletic performance in elite soccer players: a systematic review.

  Journal of the International Society of Sports Nutrition, 2023 · https://pubmed.ncbi.nlm.nih.gov/37462346/
- Nutritional Strategies for Optimizing Health, Sports Performance, and Recovery for Female Athletes and Other Physically Active Women: A Systematic Review.

  Nutrition reviews, 2025 · https://pubmed.ncbi.nlm.nih.gov/38994896/