

**RED BULL ENERGY DRINK.
INFORMATION
FOR COMPETITIVE ATHLETES
AND THOSE WHO
FOLLOW IN
THEIR FOOTSTEPS.**

Red Bull[®]

ENERGY DRINK
www.redbull.com

Shaun Baker/GBR, kayaking





MORE ENERGY MEANS MORE SUCCESS.

Athletes experience intense mental and physical stress and strain during competitions and also when they are training. Red Bull Energy Drink has been specially developed to provide the additional energy that athletes need to overcome physical and mental stress during training and before, during and after competitive events. Athletes from a variety of sports rely on

the power of Red Bull Energy Drink, and they have a good scientific basis for doing so. The power of Red Bull Energy Drink has been tested and proven repeatedly in a series of comprehensive studies.

This brochure explains how Red Bull Energy Drink works and gives competitive athletes advice on how to use it successfully.

RED BULL, THE ENERGY DRINK THAT STIMULATES BOTH MIND AND BODY.

Since its conception in 1987, quite a number of studies have been undertaken by doctors and scientists who are renowned in their particular fields to understand the physiological significance of Red Bull Energy Drink and its unique combination of ingredients. These studies indicate that Red Bull Energy Drink produces a significant increase in both physical performance and cognitive functions. The studies, some of which were carried out on top athletes, provided

evidence of enhanced performance following consumption of Red Bull. Ever since Red Bull was introduced to the market, it has been used by champions in both recreational and competitive sports to achieve improved performance. In addition to the results obtained from scientific studies, the ongoing partnership between a wide variety of athletes and Red Bull is testimony to the claim that Red Bull actually works.

Shaums March/USA, MTB-freeriding





RED BULL IS NOT A REFRESHMENT DRINK. IT IS THE ENERGY DRINK THAT DOES WHAT IT PROMISES.

Red Bull and its effect on the body.

Since the beginning of the 1990s, a series of sports medicine studies on Red Bull Energy Drink have explored the effects on physical performance. Some of the major studies are described below.

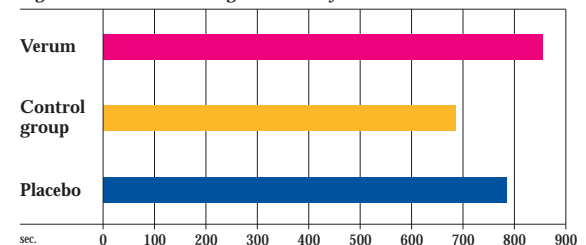
- In a study carried out by ISME (the Institute for Sport, Medicine and Nutrition in Germany), the effects of Red Bull on performance were determined for ten endurance-trained athletes cycling on a cycle ergometer. The subjects performed three trials and were given different drinks between trials: a placebo

(carbohydrate solution), a control drink (carbohydrate solution with caffeine) and Red Bull Energy Drink (verum).

The study revealed a significant increase in endurance at the maximum intensity level with Red Bull compared to placebo and control drinks (Fig. 1).

Based on different parameters measured during the study, the authors concluded that the increase in endurance was due to an improvement in the heart's pumping capacity.⁹

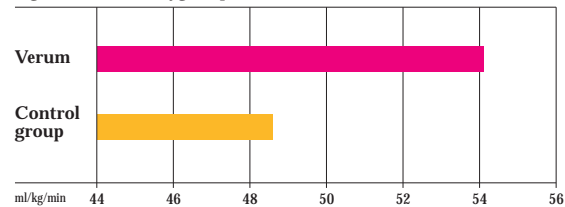
Fig. 1: Endurance at the highest intensity level



● The Institute of Sport Sciences at the Johann-Wolfgang-Goethe University in Frankfurt took this working hypothesis and verified it in a further study with 17 amateur sportsmen. Apart from endurance, they also looked at the maximum oxygen uptake ($VO_2 \max$), a parameter which is used to indirectly

determine the pumping capacity of the heart. They found a significant increase in performance at the maximum intensity level, confirming the previous findings, along with a concurrent significantly higher oxygen uptake in the Red Bull group compared to the control group (Fig. 2).²⁾

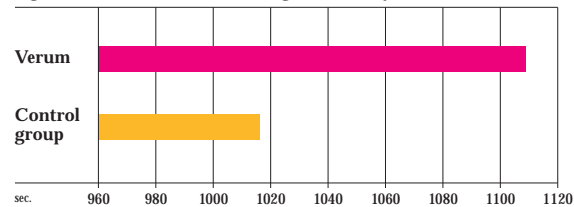
Fig. 2: Maximum oxygen uptake ($VO_2 \max$)



● Another study of physical performance by non-athletes was conducted at the Department of Psychology, University of the West of England, Bristol. This study demonstrated a significant

increase in aerobic endurance capacity at the highest intensity level following administration of Red Bull versus the control drink (Fig. 3).

Fig. 3: Aerobic endurance at the highest intensity level





This finding further confirms the results obtained by German researchers and once again demonstrates the role of Red Bull in boosting endurance.³⁾

- Improved pumping capacity of the heart increases the maximum oxygen uptake, which leads to improved performance (endurance). The pumping capacity of the heart can be determined directly by means of ultrasonic tests (echocardiography). This type of testing was carried out by the Institute of Sports Medicine at the University of Paderborn in Germany to establish the effect of Red Bull Energy Drink on heart performance. Subjects were given different drinks at rest, before and shortly after maximum exertion. It was shown that the cardiac stroke volume (the quantity of blood pumped into the arteries with each heartbeat) was higher after taking Red Bull Energy Drink than after the placebo and control drinks.⁴⁾

Summary

Red Bull is an energy drink that improves endurance at maximum intensity levels. Athletic performance, and endurance in particular, depends on an optimum supply of energy. Athletes need proper training and nutrition to maximise their performance. In addition to proper sports nutrition, adequate fluid intake (water, etc.) is critical, especially during intensive sport activities. Without adequate fluid intake, intense physical activity may lead to dehydration. As Red Bull has not been formulated to deliver re-hydration, we encourage people who are engaged in sport to also drink lots of water during intense exercise.

Red Bull Energy Drink increases endurance.

Red Bull makes champions.

Even athletes who are extremely fit fail to give their best performance if they lose concentration during sporting activity. Attention or vigilance, concentration and reaction time reflect the mental capacity of the brain and can play a critical role in winning or losing a game or race.

Whilst it is relatively easy for an athlete to evaluate his or her physical strength, it is considerably more difficult to determine one's mental strength. It is often only during the analysis after a defeat that athletes recognise the existence of problems like lack of attention, concentration and/or delayed reaction time. This can be a real problem for athletes. The secret lies in good mental preparation, adequate sleep, rest and relaxation, and adequate sports nutrition. Optimising these elements has been shown to enhance mental power. Enhanced mental focus, together with fierce determination, are critical factors, not only in sport but also in

everyday life. They are factors which determine one's success or failure.

Red Bull Energy Drink contains substances which have a positive influence on mental strength. This has been demonstrated by various working groups applying neuro-physiological and neuro-psychological tests.

- The Institute for Sports Medicine at the University of Paderborn in Germany used EEG (electroencephalography) to analyse the influence of Red Bull Energy Drink on brain activity. Thirteen athletes were recruited for this study, which involved testing on a cycle ergometer. The test consisted of three trials, and the volunteers were given a placebo (carbohydrate solution), a control drink (carbohydrate solution with caffeine) or Red Bull (verum) before the test. The results revealed the greatest increase in readiness potential – which indicates alertness and concentration – after drinking Red Bull Energy Drink compared to the control and placebo drinks.⁵⁾

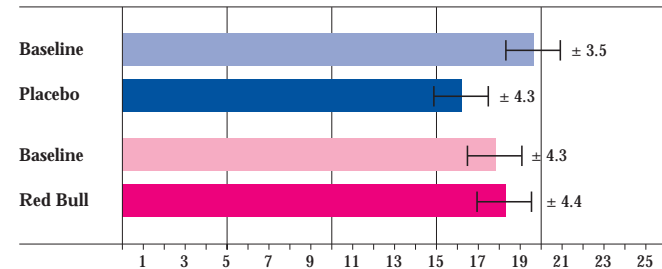




● In a double-blind, placebo-controlled study carried out at the University of Vienna, Austria, ten volunteers were subjected to electro-physiological studies to test attention, mood and reaction time. Reaction time was measured by presenting auditory stimuli. The study showed that the reaction time was improved in the group that had been treated with the Red Bull active ingredients (caffeine/taurine/glucuronolactone). The "perceived state" of the volunteers was assessed using the "Basler Befindlichkeit" questionnaire, a standard test for assessing mood in terms of life quality and emotional well-being. The test demonstrated that,

compared with the Red Bull group, the values for vitality, social extroversion and the sum of the values for well-being were much lower in the placebo group (Fig 4). Psychometric tests were also performed to evaluate attention. The so-called "d2" test is a speed-and-power-test that measures attention capacity in a stressful situation. The "d2" test showed an improvement in the values for psychomotor speed as well as for overall power of concentration in a stressful situation following consumption of the Red Bull active ingredients (caffeine/taurine/glucuronolactone).⁶⁾

Fig. 4: Vitality (V.T.)

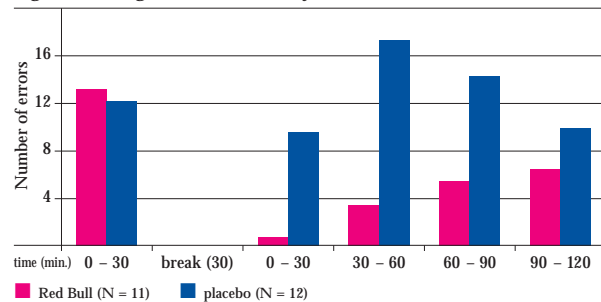


● Two additional studies were conducted at Loughborough University in Leicestershire, the leading British institute specialising in the effects of tiredness and sleep. Researchers used a car simulator to examine the effects of Red Bull on sleep-deprived drivers who are likely to have concentration lapse-related accidents. The findings showed that there was a consistent reduction in subjective sleepiness after taking Red Bull. These findings were corroborated by corresponding EEG tests. According to the

study, not only subjective sleepiness but also unforced driving errors and reaction time were significantly reduced amongst the sample group that had drunk Red Bull (Fig. 5).

Fatigue from exertion could also lead to fatal accidents in motor sports or other competitive or extreme sports. These incidents are not uncommon in sport, and the data suggest that their frequency could be decreased if one drinks Red Bull Energy Drink.^{7, 8)}

Fig. 5: Driving mistakes caused by somnolence





● Another group of scientists from the University of the West of England in Bristol reported that Red Bull had positive effects on cognitive tasks. They described a significantly reduced reaction time and improved subjective alertness, concentration and memory (Fig. 6).³⁾

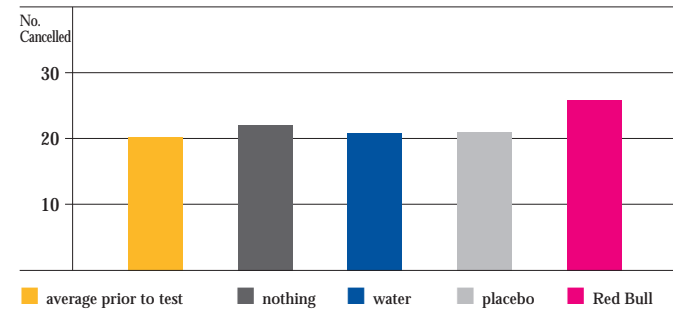
Summary

Ample evidence exists to show that a sound mind is just as important in winning

as a healthy body. This includes mental focus and determination. Red Bull Energy Drink with its effect on mental acuity and subjective well-being is the ultimate partner in your sporting career.

Red Bull Energy Drink increases and improves vigilance, reaction speed and concentration.

Fig. 6: Concentration task (n = 12)



THE RECIPE FOR SUCCESS OF ATHLETES AROUND THE WORLD.

The effect of an energy drink depends on its key ingredients, how well the product is formulated, and the precise combination of those ingredients. Red Bull Energy Drink contains ingredients that enable the body to function at a high level even in situations that cause mental and physical strain. The ingredients in Red Bull are carefully selected and combined.

One can (250 ml) contains:

Key ingredients

1.000 mg	taurine
600 mg	glucuronolactone
80 mg	caffeine
21.5 g	sucrose
5.25 g	glucose
50 mg	inositol

Vitamins

20 mg	niacin
5 mg	vitamin B6
5 mg	pantothenic acid
0.005 mg	vitamin B12



Picuruta Salazar/BRA, surfing



Properties and physiological effects of the ingredients

Taurine

Taurine is one of the most abundant amino acids in the human body. It is found in high concentrations in muscle, brain, heart and blood tissue. A person weighing 70 kg has approximately 70 g of taurine distributed throughout the body. Taurine plays an important role in neuroprotection, thermoregulation, and osmoregulation (regulation of pressure in the cells). The latest research findings also indicate that taurine could play a significant role in stress regulation. In addition, it counteracts oxidative stress which is implicated in cell death. With regard to the cardiovascular system, taurine has been shown to increase heart performance. In the liver, taurine has been reported to promote detoxification by binding harmful substances and thereby accelerating their excretion. Examples of the beneficial effects of taurine exerted by this mechanism include enhancement of cholesterol degradation and bile acid excretion.

To date, more than 2,500 reports have been published regarding taurine and its physiological effects. Taurine is often described as a conditionally essential amino acid (an amino acid that under certain circumstances is not synthesised in sufficient quantities in the body). Premature infants show renal taurine loss, which is the reason for the ingredient's inclusion in most infant formulas. Relative taurine loss can occur in some other physiological situations, such as high stress and physical exertion. Observation of endurance-trained athletes over a six-month period during the build-up or training phase showed a significant drop in serum taurine level. Other studies also demonstrated increased excretion of taurine in perspiration and urine during physical exertion. Dietary supplementation of taurine during athletics thus seems to be sensible.

Caffeine

Caffeine is well known for its stimulating effect, which is most noticeable in the cardiovascular system and the brain. Scientific studies have shown that reaction speed and general alertness are significantly improved after the administration of caffeine. Furthermore, caffeine stimulates the burning of fat during endurance activities and therefore helps to preserve glycogen stores. Overall, this results in a more efficient supply of energy, and especially during extended exertion in the submaximal range (70–80%) it leads to a significant improvement in performance.

Because it acts as a stimulant, caffeine was initially placed on the list of banned substances (doping list) in 2003. As of January 1st, 2004, the World Anti Doping Agency (WADA) has removed

caffeine from the doping list. The IOC (International Olympic Committee) has accepted this recommendation. However, it is only a recommendation which is not binding on countries and associations. We still recommend that, prior to and during events, athletes limit their consumption of Red Bull to 3 - 4 cans, which equates to 240 – 320 mg of caffeine. The former limit set by the IOC was 12 mg of caffeine per litre of urine. That was equivalent to the consumption of 500 – 600 mg of caffeine (6 - 8 cans of Red Bull or 6 - 8 cups of filter coffee) over a period of 1 - 2 hours. During strenuous physical activity, we recommend that in addition to Red Bull, athletes drink sufficient fluids in the form of water, preferably in a 1:1 ratio.





Glucuronolactone

Glucuronolactone is a carbohydrate which is a natural constituent of the human body. It is also present in human nutrition such as red wine and grain. Glucuronolactone has been reported to perform a detoxifying function by binding metabolic products. In the liver, toxins are bound and made water-soluble so they can be easily excreted via the kidneys. Glucuronolactone mediates this detoxification process by stabilising the toxic compounds so that they cannot be reabsorbed while passing through the elimination route.

Carbohydrates

As primary energy-giving substances, Red Bull Energy Drink contains carbohydrates in the form of sucrose and glucose, giving a calorific value of 45 kcal/100 ml. The consumption of drinks high in carbohydrates, especially before, during and after exercise, is important because the muscle's own immediate reserves of glycogen are protected, meaning periods of exertion can be maintained for longer and more intensively. New sources of energy

are provided if the body's reserves of glycogen are already exhausted, and the availability of liquid nutrients can help offset the effects of an insufficient intake of foodstuffs. This is particularly important after exercise because after periods of intensive physical and mental activity, the athlete may feel a distinct lack of appetite. Red Bull also contains carbohydrate-like ingredients such as glucuronolactone (see above) and inositol.

Vitamins

Vitamins are essential for maintaining normal physical functions. The B vitamins are known to serve as a co-factor in a variety of metabolic reactions that take place in the body. The B vitamins in Red Bull play an important role in enhancing mental performance and physical endurance. Conversely, a shortage of B vitamins leads to a drop in both physical and mental abilities. Hence, from the health point of view in general and the perspective of sports medicine in particular, it is advantageous for Red Bull to contain B vitamins.

RED BULL GIVES YOU WINGS, WHENEVER YOU NEED THEM.

It is generally recognised that during physical activity our bodies require more micro- and macro-nutrients. An athlete can only realise his or her full performance potential if the levels of these nutrients remain adequate. The way Red Bull Energy Drink is used in sports varies depending on the athlete and the type of sport. Based on the experience of many top-athletes, there are a number of different ways of using the product:

before: „You need a lot of physical and mental energy in my sport. More than anything else, you need to be able to concentrate properly to make the right split-second decisions. Red Bull gives me added energy and helps me concentrate at just the right moment“

(Orlando Duque, COL, cliff diving)

during: When performing intense endurance sports, many athletes consume 1 – 2

cans of Red Bull plus sufficient amounts of water depending on the duration of activity.

„I have been using Red Bull in training and competitions for a very long time. I have the confidence that it helps me maintain my speed even when the going gets tough.“

(Annaleah Emmerson, GBR, Triathlon)

after: „There are three times in particular when I use Red Bull: after training and competitive events to recover faster, and during the race itself. Between the qualifying and the final rounds, I drink a can of Red Bull to refill my energy tanks.“

(Shaums March, USA, MTB-Freeriding)

Because of the ingredients it contains – carbohydrates, taurine, glucuronolactone, caffeine and vitamins – the consumption of Red Bull Energy Drink can make a significant contribution to the enhancement of performance in sports.





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