

Magnesium Supplementation – When and With What?

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There is now very little discussion in regards to whether athletes should make use of magnesium supplementation, with an ever-increasing body of research driving home the importance of this key mineral and a broadened base of athletes who wisely use magnesium products to address their requirements. Magnesium is a component of more than 300 enzymes in the body, and has been shown to increase physical performance, improve sleep, improve hydration, reduce incidence of cramp, reduce palpitations and improve cardiovascular health in general. Considering that magnesium intake in Western population falls well short of even the meager RDAs (Institute of Medicine, 1997), supplementation is clearly warranted – but what form of magnesium should be taken? When is the best time to take it? And with what?

There appears to be no apparent difference in magnesium absorption whether it be consumed in the morning, during the day or evening. The power of magnesium to enhance sleep is well-documented and this is the reason behind the widespread recommendation to take magnesium in the evening. There is no data to back up this suggestion; however, this seems to only be the case as no-one has conducted the experiment, not because this sleep-enhancing effect does not occur. It is my experience, both for myself and clients, that sleep is definitely improved when magnesium is taken in the evening (compared to the morning etc).

One factor that does have a potent effect on magnesium absorption is what is consumed with it. Whilst there have been some studies that show increased absorption of magnesium with diets high in protein and medium chain triglycerides (Bohn, 2003), the data on macronutrient intake and magnesium is quite inconclusive and my own experience is also that this part of the diet has no effect on absorption rates.

However, one of the ways that the body regulates mineral balance is through competition for absorption at the intestines; thus, higher intake of other minerals could compromise magnesium absorption. The minerals that compete for absorption with magnesium are calcium, phosphorus and zinc. The idea that zinc could reduce intestinal absorption of magnesium is especially interesting, as both zinc and magnesium are present in the acclaimed ZMA formula used by many athletes and bodybuilders. ZMA was shown to boost testosterone and growth hormone in athletes (Brilla and Conte, 1999) although it should be said that this research was conducted by the patent holders and has not been repeated in further experiments. In any case, ZMA contains 30mg of zinc monomethionine aspartate, 450mg of magnesium aspartate and 11mg of vitamin B6. So does zinc reduce the availability of magnesium? The answer is yes, but not at these levels. At a dose of 142mg/day, zinc does compromise magnesium absorption (Spencer et al, 1994). However, at the levels we are talking about (15-30mg), there is no data to suggest that zinc can antagonise magnesium absorption and I see no reason not to take the two together and, as a staunch advocate of addressing zinc intake, this is something I would normally recommend to the majority of my clients.

I do, however, see reason to avoid taking magnesium with calcium. Or, more accurately,

taking magnesium in the presence of calcium and phosphorus. Calcium has been shown to decrease magnesium absorption in many studies (reviews by Hardwick et al, 1991; Brink and Beynen, 1992), although there some studies in which this calcium-mediated reduction in magnesium absorption did not occur (Andon et al, 1996). This contradictory results may be explained by other studies (Brink, 1992a) which proposed that calcium and phosphorus, but not calcium alone, would decrease magnesium absorption. So what does this mean for those using magnesium supplements? Well, the reality is that phosphorus is present across virtually all foods so a simplistic way of looking at it is that if you are eating foods, you are consuming plenty of phosphorus. Any further intake of calcium-rich foods will be enough to compromise magnesium absorption. As such, I would recommend that you take magnesium away from foods, especially those with a significant calcium content.

Another reason to avoid consuming magnesium with foods is the presence of phytic acid within many foods. Phytic acid is a compound that is present in the fibre of legumes and grains and, although can have some positive effects on conditions in the colon, it is considered an anti-nutrient as it causes mineral binding in the intestines, forming insoluble complexes with calcium, magnesium, iron and zinc (Hurrell, 2003; Food and Nutrition Board, 1973). Absorption of these minerals is duly reduced. Phytic acid is present in almost all plant foods at low levels, but it particularly high in wholewheat and soy products, and most nuts contain significant amounts.

So far, we can conclude that the most reliable way to get the most out of your magnesium supplement is to take it on an empty stomach before bed. However, this may be an issue for those who's schedules or diet plans mean that they are eating last thing at night to mediate the catabolic state that inevitably occurs. If you are eating last thing at night, then taking a magnesium supplement half an hour beforehand could be a simple solution. If you are in a position where you need to take it with food, then you need to ensure that you are not taking in significant quantities of calcium/phosphorus, or phytic acid. This means whey protein (or the poor quality casein, for that matter) is out. So are nuts and wheat products. However, whilst a complex-protein meal based around meat might not be great at this time of day, there is no reason not to use eggs, either as an omelette etc or in powdered egg white form. So the magnesium user does have options here, although the simplest (and my default) choice would still be on empty stomach last thing.

If we can conclude that taking magnesium on empty stomach (with zinc) before bed confers reliable absorption, then the only thing left to do is decide which form of magnesium to use. Many of the magnesium supplements available, especially the cheaper ones, are found in Magnesium Oxide form. This costs little to produce but yields very little absorption. Research from decades ago showed that, when magnesium was consumed in citrate form, 65% formed a soluble complex; in other words, 65% of it was absorbable (Lingberg et al, 1990). However, when the same ion was bound with oxide, the soluble complex was barely measurable. Citrates, taurates, ascorbates, lactates, chlorides and picolinates are a much better bet, all scoring well for bioavailability and differing very little amongst one another (Firoz and Graber, 2001). My preferred form is magnesium taurate, which is the ion bound to taurine. This is a good idea as the effects of taurine on the body are very synergistic with that of magnesium, especially in regards to muscle relaxation and deeper sleep.

The benefits of supplementing with magnesium are well known. Above I have outlined the relevant concerns in ensuring that any steps to improve magnesium intake results in corresponding increases in magnesium status throughout the body. If you are taking magnesium but have not noticed the difference, then the above considerations should cast

light on why. If you are training hard and not taking magnesium, then take action now!

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