

# MAGNESIUM

## SUMMARY REPORT: CONSIDERATION FOR CLASSIFICATION OF A SUPPLEMENT INGREDIENT

The ABCD Classification system ranks sports foods and supplement ingredients into four groups according to scientific evidence and other practical considerations that determine whether a product is safe, permitted, and effective in improving sports performance. The classification of supplements and sports foods is made via the consideration of the AIS Sports Supplement Framework Committee and evolves according to new knowledge plus the informed direction of our key stakeholders. This report summarises decisions made regarding the addition or reclassification of a substance within the System, based on evidence provided by the applicant and assessed (and potentially augmented) by the Framework Committee.

### SUMMARY REPORT FOLLOWING CONSIDERATION OF ADDITION/ALTERATION OF SUPPLEMENT INGREDIENT

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| <b>Name/ Formulation &amp; description</b>             | Magnesium [Mg <sup>2+</sup> ] - as in Magnesium Oxide  |
| <b>Current AIS Supplement Framework Classification</b> | Group C  |
| <b>Agreed AIS Supplement Framework Classification</b>  | Group C  |
| <b>Proposed benefit(s)</b>                             | <ul style="list-style-type: none"> <li>&gt; <b>Anti-inflammatory</b> - Attenuation of the inflammatory IL-6 response<sup>1</sup></li> <li>&gt; <b>Smooth Muscle Relaxant</b> - Reduced blood pressure in the post exercise state<sup>2</sup>, Bronchodilator effects in Asthma through intravenous or inhaled routes only<sup>3</sup></li> <li>&gt; <b>Neuromuscular strength</b> may be influenced by a higher dose and duration of Magnesium supplementation with training intensity<sup>4</sup></li> <li>&gt; <b>Mood</b> - Magnesium deficiency is thought to contribute to a HPA axis disbalance and associated mood disorders<sup>1</sup></li> <li>&gt; <b>Bone Healing</b> - Magnesium induces an osteogenic effect in the bone marrow space by activating the canonical Wnt signaling pathway, which in turn causes bone marrow stem cells to differentiate toward the osteoblast lineage<sup>5</sup></li> </ul> |
| <b>Proposed mechanism of action(s)</b>                 | <p>Magnesium plays an important role in many functions in the body. Under normal conditions, dietary intake and GI function, the human body is able to absorb and maintain magnesium at homeostatic levels.</p> <p>It is thought that magnesium losses through sweat may be greater due to high training volumes in athletes resulting in suboptimal magnesium levels.</p> <p>Regarding improvements in blood pressure, magnesium plays an important role in muscle contraction and thus correction of deficiency is thought to assist in contract of blood vessels and improvement in blood pressure.</p> <p>Magnesium and its role in the stress response is not yet clear. Magnesium deficiency is thought to contribute to a HPA axis disbalance and associated mood disorders.<sup>1</sup></p>  |

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| <p><b>Proposed mechanism of action(s)</b></p> | <p><a href="http://www.paediatricfoam.com/2017/06/nebulised-magnesium-sulphate-nms-for-acute-asthma-in-children-whats-the-evidence/">www.paediatricfoam.com/2017/06/nebulised-magnesium-sulphate-nms-for-acute-asthma-in-children-whats-the-evidence/</a></p>  |
| <p><b>Summary of supporting evidence</b></p>  | <p>Overall evidence is equivocal regarding whether Mg supplementation in the realm of RDIs provides a benefit to recovery in athletes. Further exploration of whether any benefit seen is due to suboptimal baseline magnesium levels is needed, as well as larger sample sizes and studies being conducted in both men and women.</p> <p>Evidence to this point would suggest supplementation does not offer a performance benefit to trained athletes with sufficient dietary intake. Small scale studies suggest it may improve 1RM and countermovement jumps in trained athletes however larger scale studies needed.</p> <p>Even with consideration for those with suboptimal dietary intake (due to restrictive diets for body composition, due to food beliefs etc.) diet manipulation likely remains the preferred strategy for correction. Given the difficulty in assessing actual Mg status, possible use of a batch tested multivitamin may assist in achieving RDIs if clinical assessment leads to suspicion of suboptimal intake.</p> |
| <p><b>Limitations to current science</b></p>  | <ul style="list-style-type: none"> <li>&gt; Theoretical side effects of toxicity - include hypotension, muscle weakness, respiratory fatigue and apnoea</li> <li>&gt; Current evidence would suggest supplementation <b>does not offer a performance benefit to trained athletes with sufficient dietary intake.</b></li> <li>&gt; Small scale studies suggest it may improve 1RM and countermovement jumps in trained athletes however larger scale studies needed.</li> </ul>  |
| <p><b>Final consensus</b></p>                 | <p>Where nutritional intake is adequate, and no preexisting bony injury, ingestion of additional magnesium may show little benefit to athletes. The consensus of the group was to maintain classification as Group C supplement. It may be included in a "bone pack" in conjunction with Calcium and Vitamin D, to complement bone healing in athletes with traumatic or stress fractures.<sup>5</sup></p>   |

## REFERENCES

1. Dmitrašinić, G., Pešić, V., Stanić, D., Plečaš-Solarović, B., Dajak, M., & Ignjatović, S. (2016). ACTH, Cortisol and IL-6 Levels in Athletes following Magnesium Supplementation. *J Med Biochem*, 35(4), 375-384. doi:10.1515/jomb-2016-0021
2. Kass, L., Weekes, J., & Carpenter, L. (2012). Effect of magnesium supplementation on blood pressure: a meta-analysis. *Eur J Clin Nutr*, 66(4), 411-418. doi:10.1038/ejcn.2012.4
3. Bhatnagar, Pallav & Guleria, Randeep & Kukreti, Ritushree. (2006). Pharmacogenomics of  $\beta_2$ -agonist: Key focus on signaling pathways. *Pharmacogenomics*, 7, 919-33. 10.2217/14622416.7.6.919.
4. Heffernan SM, Horner K, De Vito G, Conway GE. The Role of Mineral and Trace Element Supplementation in Exercise and Athletic Performance: A Systematic Review. *Nutrients*. 2019 Mar 24;11(3):696. doi: 10.3390/nu11030696. PMID: 30909645; PMCID: PMC6471179.
5. Chu-Chih Hung et al, The role of magnesium ions in bone regeneration involves the canonical Wnt signaling pathway, *Acta Biomaterialia* 98 (2019) 246–255



The Australian Institute of Sport (AIS) Supplement Framework is an initiative of the Australian High Performance Sport System. The AIS acknowledges the support of members of the National Institute Network (NIN) and National Sporting Organisations (NSO) and their staff in delivering content expertise. This information is intended to help athletes, coaches and scientists make evidence-based decisions about the use of supplements and sports foods. Before engaging in supplement use, we recommend that each individual refer to the specific supplement policies of their sporting organisation, sports institute or parent body, and seek appropriate professional advice from an accredited sports dietitian ([www.sportsdietitians.com.au](http://www.sportsdietitians.com.au)).

Athletes should be aware that the use of supplements may have doping implications. Athletes are reminded that they are responsible for all substances that enter their body under the 'strict liability' rules of the World Anti-Doping Code. Some supplements are riskier than others. The Sport Integrity Australia (SIA) app is a useful resource to help mitigate the risk of inadvertent doping by helping to identify supplements that have been batch-tested. The SIA App provides a list of more than 11,000 batch-tested products. We recommend that all athletes consult the educational resources of SIA regarding the risks associated with supplements and sports foods.. While batch-tested products have the lowest risk of a product containing prohibited substances, they cannot offer you a guarantee that they are not contaminated ([www.sportintegrity.gov.au/what-we-do/supplements-sport](http://www.sportintegrity.gov.au/what-we-do/supplements-sport)).

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