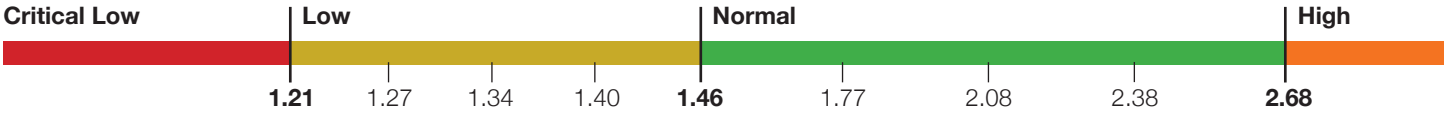
Consensus Ionized Magnesium Reference Ranges

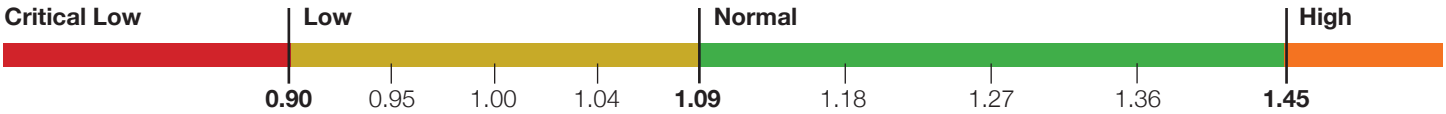
Magnesium abnormalities, in particular hypomagnesemia, can have serious clinical manifestations. The inclusion of ionized magnesium (iMg) in the testing profile enables early, accurate diagnosis of hypomagnesemia and the prevention of clinically negative outcomes.

When using iMg it is important to understand the reference range and the values for iMg at which a physician may wish to intervene with magnesium supplementation. Supplementation protocols should always be guided by the complete clinical picture. The following graphic provides a comparison of commonly accepted reference ranges for iMg vs. total magnesium (tMg) in healthy individuals.

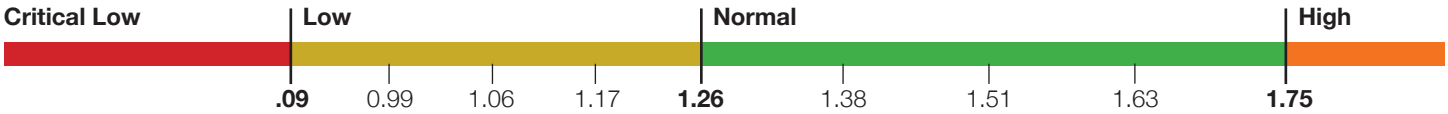
Adult tMg (mg/dL)



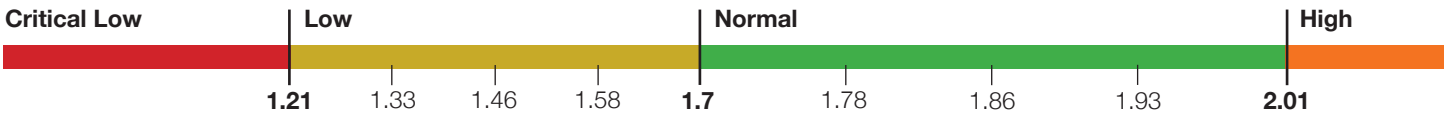
Adult iMg (mg/dL)



Pediatric tMg (mg/dL)



Pediatric iMg (mg/dL)



Disclaimer:
- Note that units are in mg/dL.
- These ranges are the commonly accepted reference ranges for tMg and iMg, but the range may vary from lab-to-lab, so these are to be used only as guidelines and not to replace local laboratory values.
- These do not represent treatment recommendations. Clinical judgment and experience should guide any therapeutic decisions.

Conversion Factors:
- From mg/dL to mmol/l multiply by 0.41
- From mg/dL to MEq/L multiply by 1.22

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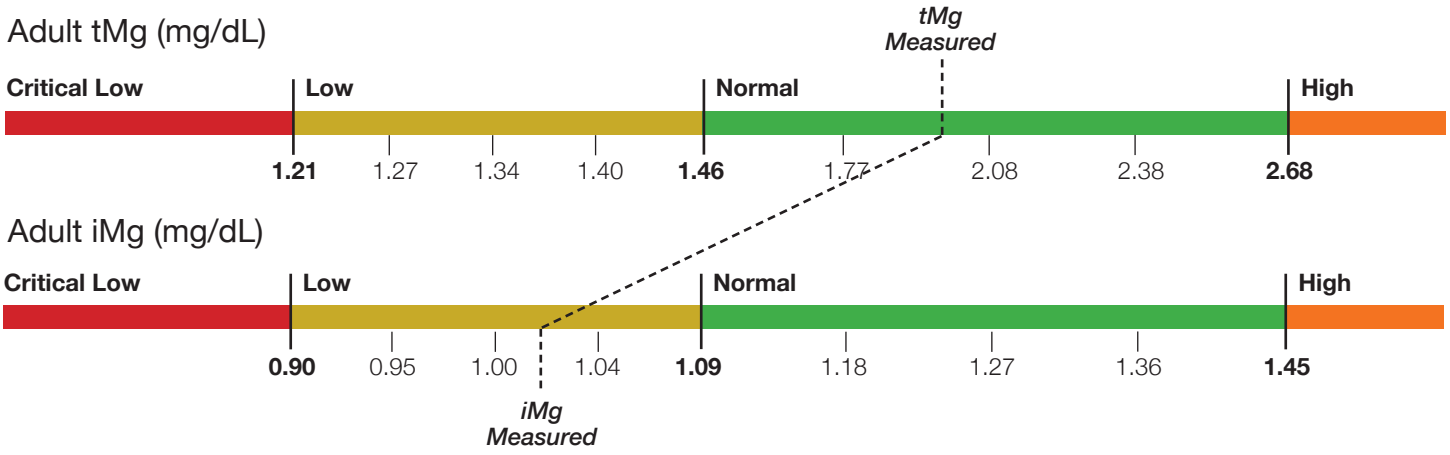
Two Clinical Situations Where iMg is Critically Important

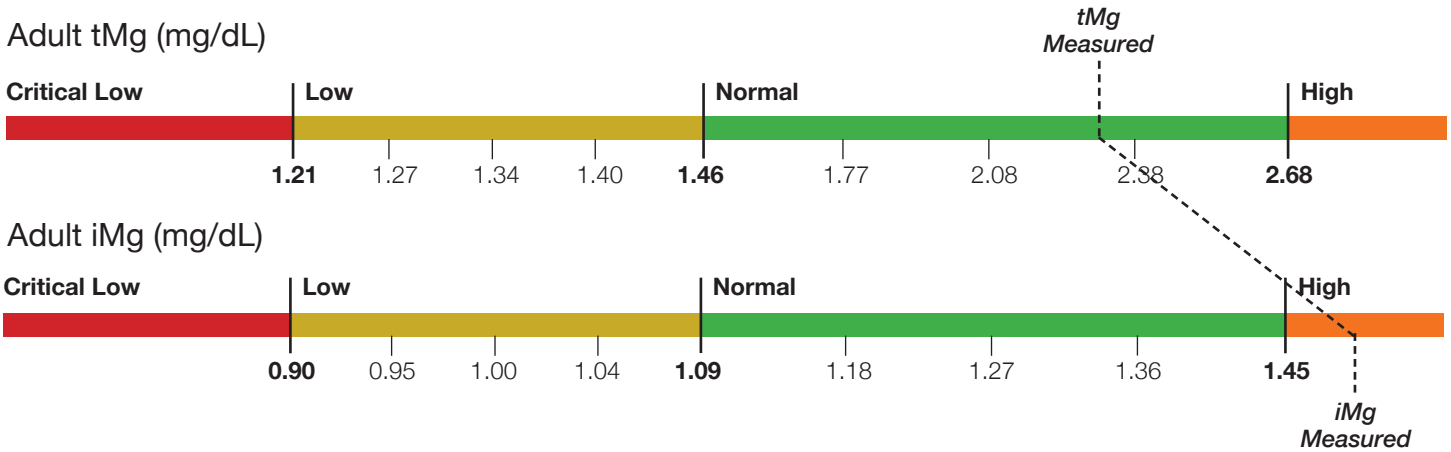
Patients Undergoing Continuous Renal Replacement Therapy (CRRT)

The use of calcium chelators such as citrate, which also chelates magnesium, will cause a lower result when measuring biologically active iMg. Hutten et. al.[1] found that patients receiving CRRT with citrate anticoagulation had normal tMg levels, but low iMg levels. This is due to magnesium ions being bound by the citrate, and the citrate-magnesium complex being measured in the tMg level. These patients are actually hypomagnesemic but would not be recognized as such if only tMg were measured.



Patients in Intensive Care (ICU)

In a study done in Surgical ICU patients at Massachusetts General Hospital[2], 21% of tMg tests which were reported as normal were hypermagnesemic based on iMg. This exposes patients to potential risks associated with elevated Mg levels, including prolonged days on the ventilator, muscle weakness, QT prolongation, and cardiac arrhythmia. In addition, there were many patients with low tMg and normal iMg, which led to unnecessary Mg supplementation and repeat blood draws.



1. Hutten et al., Ionized and not total magnesium as a discriminating biomarker for hypomagnesaemia in continuous venovenous haemofiltration patients. *Nephrol Dial Transplant*, 2021.

2. Yeh, et al. Total and ionized magnesium testing in the surgical intensive care unit - Opportunities for improved laboratory and pharmacy utilization. J *Crit Care*, 2017, 42, 147-151.

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