

- 2/3 Bone
  - NB not as Hydroxyapatite
- 1/3 Intracellular
- 1/100 Extracellular
  - 65% ionized (active form)
  - 20% bound to negatively charged proteins primarily albumin (inactive form)
  - 15% complexed with anions like citrate, PO<sub>4</sub>, SO<sub>4</sub>, other proteins, etc (inactive form)
  - NB like K+ serum Mg poorly reflects total body Mg
  - NB unlike calcium labs measure all forms of magnesium
  - NB you don't have to check ionized Mg it is not that important
- NB no hormone regulation rather the [Mg] itself regulates its absorption, secretion, etc in bone, GI, and kidney

| Hypo Mg   | Hyper Mg   |
|---|--|
| <p>In = GI (300mg/d is normal intake but only 100mg/d is absorbed (throughout SI) w/ 200mg/d excreted)</p> <ul style="list-style-type: none"> <li>• Decreased Intake               <ul style="list-style-type: none"> <li>◦ Alcoholism (MOST COMMON)</li> </ul> </li> <li>• Decreased Absorption               <ul style="list-style-type: none"> <li>◦ Diarrhea, etc</li> </ul> </li> </ul> <p>Stored = Bone (refer to HypoCa)</p> <p>Out = Kidney (300mg/d is filtered and 200mg/d is reabsorbed (15% PCT, 70% Thick LOH, 15% DCT) and thus 100mg/d excreted)</p> <ul style="list-style-type: none"> <li>• Decreased Reabsorption               <ul style="list-style-type: none"> <li>◦ @ PCT: drugs the block reabsorption like Aminoglycosides, Amphotericin, Cisplatin, Cyclosporin, etc</li> <li>◦ @ LOH: Loop Diuretics / Bartter's Syndrome</li> <li>◦ @ DCT: HyperCa (Ca competes for Mg for reabsorption)</li> </ul> </li> </ul> <p>Other</p> <ul style="list-style-type: none"> <li>• Low Insulin States</li> <li>• Late Burns</li> <li>• High Thyroid</li> <li>• Pancreatitis</li> </ul> | <p>GI</p> <ul style="list-style-type: none"> <li>• Increased Intake               <ul style="list-style-type: none"> <li>◦ Mg containing laxatives / antacids</li> </ul> </li> </ul> <p>Bone (refer to HyperCa)</p> <p>Kidney</p> <ul style="list-style-type: none"> <li>• Decreased Filtration               <ul style="list-style-type: none"> <li>◦ RF</li> </ul> </li> <li>• Increased Reabsorption               <ul style="list-style-type: none"> <li>◦ Thiazide Diuretics / Gittleman's Syndrome</li> </ul> </li> </ul> <p>Other</p> <ul style="list-style-type: none"> <li>• Iatrogenic (MOST COMMON) esp women who are being treated for preeclampsia w/ MgSO<sub>4</sub></li> <li>• High Insulin States</li> <li>• Early Burns</li> <li>• Low Thyroid</li> <li>• Adrenal Insufficiency</li> <li>• Li (actually slightly high Mg makes people feel a little better)</li> </ul> |
| <ul style="list-style-type: none"> <li>• HypoCa symptoms (low Mg inhibits PTH release and sensitivity)</li> <li>• HypoK symptoms (low Mg inhibits renal K reabsorption)</li> </ul>  | <ul style="list-style-type: none"> <li>• 8 (CNS depression) → 10 (Decreased DTRs) → 15 (CV/Pulm Depression w/ HypoTN, bradycardia, etc) → 17 (Coma, Prolonged PR, QRS, QT) → 20 (Cardiac Arrest)</li> <li>• NB hyperMg acts like a CCB</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Mild (1-1.5): eat nuts/raisins and Magnesium Gluconate 500mg PO TID (27mg elemental Mg) many others but this is best absorbed</li> <li>• Mod (&lt;1): Magnesium Oxide 400mg PO TID (240mg elemental Mg) many others but this is best absorbed</li> <li>• Severe (&lt;1 w/ Sx): Magnesium Sulfate 1-4g IV over 2-8hrs (750mg-3g elemental Mg, 1g increases serum Mg by only 0.1!) NB conventionally is taught that Mg should be given over 1-4hrs but when you give that much that quick it just spills over in kidney therefore slow down infusion, 290mg IM 1-3x/wk is another option for chronic hypoMg</li> </ul>   | <ul style="list-style-type: none"> <li>• Mild (2-3): withhold exogenous Mg the kidney can usually clear it, loop diuretics, fluids</li> <li>• Severe (&gt;3): HD, 10% CaGluconate (refer to Severe HypoCa Tx), CV/Pulm Support</li> </ul>  |
| <ul style="list-style-type: none"> <li>• very common in surgical patients</li> <li>• hypoMg makes hypoK and hypoCa more difficult to treat therefore always treat Mg b/f anything else</li> </ul>   |  |