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Magnesium in the CNS: recent advances and developments

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Abstract

A potential neuroprotective role for magnesium in neurological disease has been appreciated for almost three decades, yet translation to the clinical arena has proven elusive. Accumulating experimental evidence continues to suggest that magnesium plays a critical role in a number of neurological conditions including headache, stress, alcohol/drug intoxication, acute brain injury, seizures, Parkinson's disease and Alzheimer's disease. Simple administration of a magnesium salt in these conditions has not always been therapeutically successful, with a number of studies showing poor penetration of serum magnesium across the blood brain barrier. Several studies have since demonstrated that using a carrier such as polyethylene glycol can address this, simultaneously reducing the dose of magnesium required to achieve the desired central effects while at the same time attenuating deleterious peripheral effects. Alternatively, administering a more permeable magnesium salt, such as magnesium threonate, is seen as the preferred option in more chronic neurological conditions, with positive results having been achieved in experimental models of Alzheimer's disease. Irrespective of the approach, improved central penetration of a magnesium compound that avoids peripheral side effects of high magnesium dosages is clearly a desirable outcome, and should now be investigated in animal models that accurately mimic the complex human condition.

Keywords: alcohol; amyloid; blood brain barrier; inflammation; magnesium; treatment.

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