

**The Ritalin Paradox:
A Psychophysiological Perspective on LD/ADHD**

Richard Malter, Ph.D.

Malter Institute

2295 W. Trail Blazer Drive

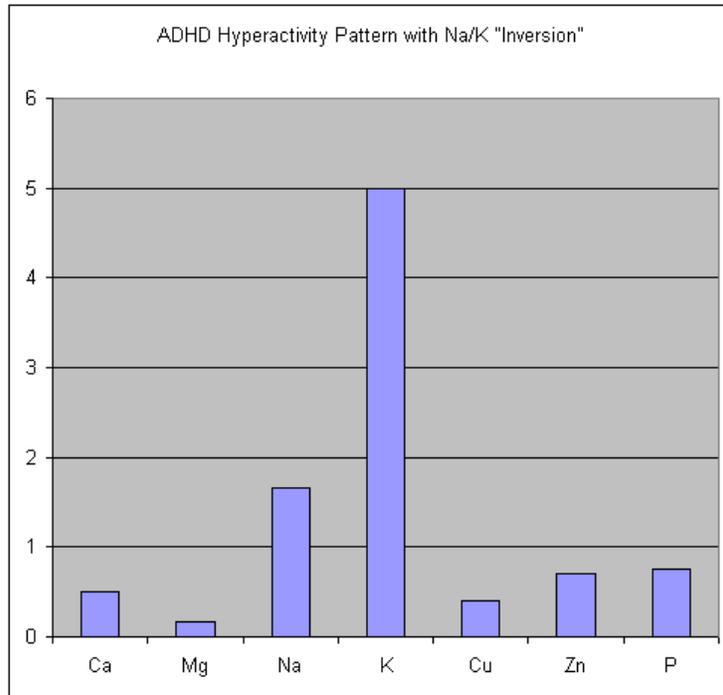
Cottonwood , AZ 86326

(928) 649-9343

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Historically, the "calming" effect of Ritalin on hyperactive children has been considered to be a clinical paradox because Ritalin is a stimulant drug. It has puzzled professionals how a stimulant drug can have a calming behavioral effect on children and adolescents with ADHD.

An explanation of this classical clinical paradox effect may be found in the hair trace mineral analysis (TMA) profiles of many LD/ADHD children. Their hair TMA profiles reveal a very consistent pattern that shows low levels of calcium and magnesium and higher levels of sodium and potassium. In addition, it is also noted that the TMA ratio of sodium to potassium (Na/K) is "inverted", i.e. it is below the ideal ratio of 2.4/1. The more this ratio inverts (i.e., $Na/K = 0.6$), the more likely that ADHD symptoms will be observed in the individual. The TMA Na/K ratio may be interpreted in terms of the psychophysiological aspects of the stress response; in particular, the adrenal part of the sympathetic response.



This inverted ratio of Na/K may be helpful in explaining why a stimulant drug like Ritalin would have a calming effect on hyperactive children and adolescents. Ritalin does, indeed, have a stimulating effect on these children, but its stimulating mechanism is neuroendocrine and biochemical, not behavioral. More specifically, its stimulating effect is on the adrenal glands and the retention of sodium in the tissues relative to potassium. It is critical for normal cellular functioning that sodium and potassium (Na and K) be in balance for the optimal operation of the Na/K pump at the cellular level. It is also critical for efficient neurotransmissions that there be a proper balance between sodium and potassium (Na and K) for neuronal conductance.

The TMA data on many ADHD children suggest that the effect of Ritalin is to temporarily normalize the ratio of Na/K in the tissues by the medication's stimulation effect on weak adrenal glands. When this temporary rebalancing of the Na/K ratio occurs, there is a tendency towards normalization of cellular metabolism and neurotransmissions. However, this rebalancing effect is only temporary and when the medication wears off, the weak adrenal glands are not capable of maintaining the proper balance of sodium to potassium (Na/K). Sodium levels relative to potassium drop again and produce the characteristic inversion of the Na/K ratio, and ADHD symptoms reappear. A rebound effect often occurs when the drug's effect wears off. Prolonged use of stimulant drugs usually will result in the loss of magnesium and zinc from cell and tissue storage so that a chronic magnesium deficiency is induced in many children taking these stimulant drugs. The zinc deficiency that also occurs will stunt growth in general and, as recent research has shown, the effect of stimulant drugs that induce zinc deficiency also stunts brain growth.

If the normal balance of sodium to potassium (Na/K) can be maintained for longer periods of time, then the hyperactive behaviors would be calmed for much longer periods of time. TMA profiles suggest several ways in which a more permanent balance of Na/K may be achieved. These mechanisms involve (1) the use of calcium and copper supplements to lower the tissue potassium level to balance the level of sodium, (2) the raising of the sodium levels by means of stimulating the weak adrenal glands either by medication or by nutritional means, or (3) using both techniques (1) and (2). As the Na/K ratio normalizes, the child achieves more self-control. The use of nutritional support for weak adrenal glands makes far more sense for the health and long-term functioning of the child than the use of a stimulant drug.

The role of toxic metals in ADHD also needs to be discussed. It is not uncommon to see significant amounts of toxic metals (lead, cadmium, mercury, aluminum, and copper) in the TMA profiles of many children who have been given a diagnosis of ADHD. Quite often, toxic metals will also affect the ratio of sodium/potassium by placing additional stress on the body and on the adrenal glands.