

The Pioneering Work of Ruth Flinn Harrell: Champion of Children

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*“The person who says it cannot be done
should not interrupt the person doing it.”
–Chinese proverb*

Introduction

Early in 1981, the medical and educational establishments were shaken to their socks. Ruth F. Harrell and colleagues, in *Proceedings of the National Academy of Sciences*,¹ showed that high doses of vitamins improved intelligence and educational performance in learning disabled children, including those with Down syndrome. Though to many observers this seemingly came straight out of left field, Dr. Harrell, who had been investigating vitamin effects on learning for forty years, was not inventing the idea of megavitamin therapy in one paper. But she had at last succeeded in focusing much-needed public attention on the role of nutrition in learning disabilities, a problem that ink-well-era U.S. RDA's and pharmaceuticals by the lunchbox-full have failed to solve.

The start of World War II was breaking news when Ruth Flinn Harrell conducted her first investigations into what she called “superfeeding.” Her 1942 Columbia University Ph.D. thesis, “Effect of Added Thiamine on Learning,”² was published by the university in 1943 and would be followed by “Further Effects of Added Thiamine on Learning and Other Processes” in 1947.³ Her research was not about enriched or fortified foods; “added” meant “provided by supplement tablets.” World War II had just ended when Dr. Harrell stated in a 1946 *Journal of Nutrition* article⁴ that “a liberal thiamine intake improved a number of mental and physical skills of orphanage children.” By 1956, Dr. Harrell had investigated “The Effect of Mothers’ Diets on the

Intelligence of Offspring,”⁵ finding that “supplementation of the pregnant and lactating mothers’ diet by vitamins increased the intelligence quotients of their offspring at three and four years of age.”

Thiamine (Vitamin B₁)

Most everyone has heard of beri-beri, and few are all that passionate about it anymore. But beri-beri, which literally means “I can’t, I can’t,” may all too well describe the learning disabled child. Such children, recognized as truly disabled by the Americans with Disabilities Act, are not unwilling but rather unable to perform well in school. To see the physical incapacitation thiamine deficiency causes in impoverished countries is all too easy. To see the mental incapacitation in American classrooms is not difficult, either. Yet both may be caused by thiamine deficiency, and both helped by thiamine supplementation. Harrell zeroed in on this topic sixty years ago, demonstrating that supplemental thiamine improves learning. One reporter wrote, “An experiment was conducted by Dr. Ruth Flinn Harrell which involved 104 children from nine to nineteen years of age. Half of the children were given a vitamin B1 (thiamine) pill each day, and the other half received a placebo. The test lasted 6 weeks. It was found by a series of tests that the group that was given the vitamin gained one-fourth more in learning ability than did the other group.”⁶

Carbohydrates, including sugar, increase the body’s need for thiamine. Children eat a lot of sugar. An unmet increase is effectively the same as a deficiency. This may be part of the mechanism of ADHD and other children’s learning and behaviour disorders, as many so-called “food faddists” or “health nuts” have proclaimed for dec-

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ades. Vitamin deficiency can become vitamin dependency. Chronic subclinical beriberi may result in thiamine dependency in the same way that chronic subclinical pellegra results in niacin dependency.

B-Complex

The B-vitamins as a group are absolutely vital to nerve function, and it would be difficult to imagine the juvenile owner of malnourished nerves performing well in school. Specifically, it is well established that thiamine deficiency causes not only loss of nerve function and ultimately paralysis, but also according to *The Nutrition Desk Reference*,⁷ “memory loss, reduced attention span, irritability, confusion and depression.” (p. 43) Riboflavin (B₂) deficiency causes “nerve tissue damage that may manifest itself as depression and hysteria.” (p. 45) Niacin (B₃) deficiency causes “loss of memory and emotional instability.” (p. 46) Pyridoxine (B₆) deficiency results in “impaired production of neurotransmitters (and) mental confusion.” (p. 48) Folic acid deficiency causes irritability, apathy, forgetfulness and hostility. (p. 49). Cobalamin (B₁₂) deficiency causes “degeneration of the spinal cord, fatigue, disorientation, ataxia, moodiness, and confusion.” (p. 51)

Though these symptoms generally appear after prolonged deficiency, they are very serious and, if untreated, the ultimate result in each case would be death. Practically speaking, a shortage of any one of the B-vitamins can be seen to lead to neurological damage sufficient to contribute to learning and behavioral troubles.

Harrell recognized that thiamine and the rest of the vitamins work better as a team. She used two clinically effective but oft-criticized therapeutic nutrition techniques: simultaneous supplementation with many nutrients (the “shotgun” approach), and megadoses. Working on the reasonable assumption that learning disabled children, because of functional deficiencies, might need higher than normal

levels of nutrients, she progressed from her initial emphasis on thiamine to later providing a wide variety of supplemental nutrients.

Deficiency Debate

The only escape from the inevitability of concluding that vitamin deficiency is a serious factor in learning is the political one: declare a victory. Dodging the issue is as easy as proclaiming that, thanks to food fortification (coupled with a generous portion of wishful thinking), no child has such deficiencies. Though the processed food industry and its apologists continue to assert exactly this, statistics fail to bear this out.

An analysis of National Health and Nutrition Examination Survey (NHANES III) data from 1988 to 1994 by Gladys Block, Ph.D., indicates that over 85 percent of American elementary school-age children fail to eat the recommended five or more daily servings of fruits and vegetables. “NHANES III, a federally sponsored survey shows that on any given day, 45 percent of children eat no fruit, and 20 percent eat less than one serving of vegetables. The average 6 to 11 year-old eats only 3.5 servings of fruits and vegetables each day, achieving only half the recommended 7 servings per day for this age group.”⁸ Additionally, Dr. Block reports, 20% of children’s caloric intake comes from junk snacks, such as soda pop, cookies, and candy.

Though it is a stretch to say that all learning and behavioral disabilities are due to inadequate vitamin intake, it is certain that some are. Behavioral deficiency tends to show up before nutritional deficiency is recognized. Arthur Winter, M.D., writes that “In thiamine (vitamin B₁) deficiency, symptoms such as lack of well being, anxiety, hysteria, depression, and loss of appetite preceded any clinical evidence of beriberi. Other studies using the Minnesota Multiphasic Personality Index (MMPI) have also demonstrated that adverse behavioral changes precede physical findings in thiamine deficiency.”⁹

Dosage Debate

Dr. Harrell anticipated that her use of megadoses would result in “controversy and brickbats.”¹⁰ She was right. A number of well-publicized studies¹¹⁻¹⁵ conducted to “replicate” Dr. Harrell’s work seemingly could not do so. Would-be “replications” fail the moment they start when they refuse to use adequate dosages. Surely it is the most basic condition for any replication that one must exactly copy the original experiment, or it is not a replication at all. When DNA replicates, it forms an exact and indistinguishable copy of the original. Even the smallest of changes can result in dysfunction, mutation, and death. Yet Harrell’s “replicators” failed to adhere to her protocol, and consequently but not surprisingly, failed to get her results.¹⁶

Probably one of the closer replications was done by Smith et al¹⁷ and even that study totally omitted desiccated thyroid, a component of the Harrell protocol that her coauthor Donald R. Davis, Ph.D., says was “emphasized to Smith (as) Harrell’s subjects received thyroid continuously.”¹⁸

F. Jack Warner, M.D., a supporter the Harrell approach¹⁹ writes: “Even today many medical professionals scoff at the validity of Dr. Ruth Harrell’s study with nutritional supplements and the important addition of thyroid medication. Dr. Harrell pleaded with her replicators to use exactly the same chemical values of supplements and medications. To date, this still has not been accomplished.”²⁰ In spite of obvious bias, negative “replication” studies using incomplete or low doses are the ones that have been accepted, and Harrell’s work shelved. This is saying that the results of inaccurate replication are more valuable than the original successful research. Imagine cloning a sheep, getting a hedgehog, and then claiming that it was the sheep’s fault. Incredible. But that is what politicized medical apologetics are capable of.

The Harrell study was successful because her team gave learning-disabled kids

much larger doses of vitamins than other researchers are inclined to use: over 100 times the adult (not child’s) RDA for riboflavin; 37 times the RDA for niacin (given as niacinamide); 40 times the RDA for vitamin E; and 150 times the RDA for thiamine. Supplemental minerals were also given, as was natural desiccated thyroid. Harrell’s team achieved results that were statistically significant, some with confidence levels so high that there was less than on chance in a thousand that the results were due to chance ($p < 0.001$) Simply stated, Ruth Harrell found IQ to be proportional to nutrient dosage. This may simultaneously be the most elementary and also the most controversial mathematical equation in medicine.

There is a tone to the controversy that does more than merely suggest that Harrell’s research was careless or incompetent. This is unlikely in the extreme; Dr. Harrell, formerly the chairman of the psychology department at Old Dominion University, had been studying children before many of her critics were even born. What is more likely is that Harrell’s critics embrace the assumption that medicine must ultimately prove to be the better approach, and if there are any megadoses to be given, they shall be megadoses of pharmaceutical products. Vitamin therapy is unattractive to pharmaceutical companies. There is no money in products that cannot be patented. Children learn at an early age that mud pies don’t sell. No investment is made, no research is done where no money is to be recovered. Drug companies do not expect to find, nor do they want to find, a cure that does not involve a drug. A tragic example is modern medicine’s approach to Down syndrome.

Down Syndrome

If there is orthodox resistance to using vitamins to enhance student learning, there is positively a fortified roadblock to the suggestion that vitamins can help children with Down syndrome. Nutrition, crit-

ics say, can not undo trisomy 21. But nutritional therapy is not a science-fiction attempt to rearrange chromosomes. Nutritional intervention may help the body to biochemically compensate for a genetic handicap. Roger Williams, discoverer of the vitamin pantothenic acid, termed this the "genetotrophic concept." Genetotrophic diseases are "diseases in which the genetic pattern of the afflicted individual requires an augmented supply of one or more nutrients such that when these nutrients are adequately supplied the disease is ameliorated."²¹ Ruth Harrell's decades of research showed that it is plausible. Conventional Down syndrome educational material holds that it is hogwash.

As of August 2003, the National Down Syndrome Society's "Position Statement on Vitamin Related Therapies" states that "Despite the large sums of money which concerned parents have spent for such treatments in the hope that the conditions of their child with Down syndrome would be bettered, there is no evidence that any such benefit has been produced."²¹

At the heart of the issue are the usual, and largely philosophical, front-line disagreements of definition and interpretation. First, what precisely constitutes a "deficiency" in a society that, as nutritional legend would have it, has eliminated vitamin deficiency? Adherents of conventional dietetics presuppose that anyone who claims that there are widespread vitamin deficiencies among children must proceed from a false assumption. Those who advocate vitamin therapy would answer that Down's creates a "functional deficiency" which must be met with appropriate supplementation. The very idea that doses sufficiently high to effectively do so should be 100 times the RDA is positively repellent to most investigators. When asked about whether she had received National Institutes of Health funding for her study, Dr. Harrell replied, "Heavens, no! Nobody knows anything about the area of dietary supplementation,

but the National Institutes of Health knows for sure it's impossible."¹⁰

Some reviews of Down nutrition studies actually state that doses as low as 500 mg of vitamin C are unsafe, and that other Harrell-sized dosages are harmful as well. In one such article posted at the Down Syndrome Information Network, the authors conclude that "If it is necessary for additional vitamins to be given to someone with Down syndrome, all that is usually needed is a multivitamin tablet, not more than once a day, at a cost of about one penny per tablet. Meanwhile, the best nutritional advice anyone can honestly offer is to consume a varied and balanced diet - whether you have Down syndrome or not."²²

Another popular argument is that, even allowing that children eat poorly, there is insufficient evidence that Down's is aggravated by poor nutrition, or helped by good nutrition. After all, Down's is a genetically-determined disease. But surely the genes do not operate in a nutrient vacuum. For example, vitamin E has recently been demonstrated to preferentially protect genetic material in Down patients' cells. "Vitamin E treatment decreased the basal and G2 chromosomal aberrations both in control and Down Syndrome (DS) lymphocytes. In DS cells, this protective effect, expressed as a decrease in the chromosomal damage, was greater (50%) than in controls (30%). These results suggest that the increment in basal and G2 aberrations yield in DS lymphocytes may be related to the increase in oxidative damage reported in these patients." The results would also suggest that antioxidant vitamin supplements would be an especially good idea for Down's individuals.²³

Although the greater question may be, can optimum nutrition help compensate for a genetic defect, the essential question must be this: can nutrition help a given Down's child? Dianne Craft, a special education teacher, comments on Harrell's 1981 research:

“Dr. Harrell noted that one of the observations that they made during this study was that when there was a ten point rise in IQ, the family noticed it. When there was a fifteen point rise in IQ, the teachers noticed it. When there was a twenty point rise in IQ, the neighborhood noticed it.

“The story of one child is particularly poignant. This seven year old child was still wearing diapers, didn’t recognize his parents, and had no speech. His motor skills were relatively unimpaired and he could walk and run fairly well. In forty days, after some of the supplements were increased, his mother telephoned. . . saying, “He’s turned on, just like an electric light. He’s asking the name of everything. He points and says, ‘What zis?’ Finally he pointed to his father and said, ‘zis?’ I said, ‘That’s your father and you call him daddy, and he looked at him and said ‘daddy.’ I’m your mother; can you call me mommy?” She went on to say, “I think he saw us for the first time.” This little boy went on to do very well in his learning, and eventually tested with an IQ of ninety, which is an average IQ.”²⁴ I have seen a beautiful photo in *Medical Tribune*¹⁰ of Dr. Harrell being hugged by one of the study group children. The kids noticed their own improvement.

Perhaps Harrell’s dramatic IQ gains were merely due to the placebo effect. If so, I want every school district on earth to lay in a stock of sugar pills, for gains like this, in only eight months, are astounding. Perhaps success was due to Dr. Harrell’s group’s expectations or to her bedside manner. But, as Abram Hoffer has said, “I am nice to all my patients. Only the ones on vitamins improve.” Harrell colleague Donald Davis writes, “No amount of matching or variable control with Harrell’s subjects could change their large IQ gains which are the crucial and so far unexplained difference between the Harrell group and others.”²⁵

When Dr. Harrell died in 1991, she was far from being alone in reporting success with high-dose nutrition therapy. Dianne

Craft writes, “For over forty years, Dr. Henry Turkel^{26,27} treated Down’s children successfully using orthomolecular methods. He used a combination of vitamins, minerals, and thyroid hormone replacement. His patients improved mentally and they lost the typical Down’s syndrome facial appearance. With over 600 children treated, he found an eighty to ninety percent improvement rate.”²⁴

To date, the orthodox Down authorities’ position may be summed up as, there is no evidence that it helps, so do not try it. Dr. Harrell’s view would be, there is reason to believe that nutrition might help, so let’s see if it does. The first view prevents physician reports. The second generates them.

Theorization can only go so far. The proof is in the pudding, and Ruth Flinn Harrell’s approach yielded smarter, happier children. Her results are sufficiently compelling justification for a therapeutic trial of orthomolecular supplementation for every learning-impaired child.

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