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Testimony for Public Hearing on Food Additives and Behavioral Disorders  
Assembly Standing Committee on Mental Health, Mental Retardation, and  
Developmental Disabilities  
New York State Assembly  
New York, NY  
October 30, 2007

I applaud this Committee for holding a hearing on food additives and behavioral disorders. That topic was widely discussed in the mid-1970s, widely researched in the next decade or so, but in recent years, despite the evidence that food ingredients affect some children's behavior, largely ignored.

The Center for Science in the Public Interest has long been interested in the safety of food additives, including the effect of additives on behavior. My book on additives, *Eater's Digest: The Consumer's Factbook of Food Additives*, was published in 1972, and in 1999 I wrote a report titled "Diet, ADHD, and Behavior: A Quarter-Century Review." The latter report reviewed the controlled scientific studies that explored the relationship between food ingredients and behavior.

While the recent British study has garnered widespread attention, it is important to recognize that it is hardly the only study. More than a dozen carefully done studies have demonstrated that food ingredients worsen Attention Deficit Hyperactivity Disorder (ADHD) or other behavior problems in children.

Most of the relevant studies focused on food dyes, because those were the main, most clearly identified substances that Dr. Benjamin Feingold, a clinician, criticized in the 1970s. Other research, though, has demonstrated that some children experience behavioral problems after consuming common food allergens, such as milk and wheat. In all, CSPI's review found that 17 of the 23 controlled studies then available found evidence that the behavior of some children significantly worsens after they consume artificial colors or certain foods.

Most of the studies were conducted on children whose parents suspected they might be sensitive to food additives or other ingredients. Typically, small numbers of children were put on a diet free of the suspected substances (usually one or several dyes) and then challenged with hidden substances. In one study funded, in part, by the Food and Drug Administration (FDA), 22 young children whose parents believed they were sensitive to artificial colors and flavors were put on a diet free of artificial colors, flavors, and other substances. When challenged with a concealed mixture of seven dyes, two of the children reacted dramatically.<sup>1</sup>

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<sup>1</sup> Weiss B, Williams JH, Margen S., et al. Behavioral responses to artificial food colors. *Science*. 1980;207:1487-8.

Some studies found much higher percentages of children to be affected. For instance, in one study, 17 of 19 sets of parents of fidgety, inattentive children rated their children's behavior as worse, sometimes sharply worse, while their children were consuming a mixture of four dyes than when consuming a placebo.<sup>2</sup>

In another study, 19 children with ADHD seemed to improve when they were placed on a highly restricted diet that excluded dyes, chocolate, milk, and other foods.<sup>3</sup> When those foods were reintroduced one by one in a subsequent double-blind, placebo-controlled trial, the behavior of 14 of those children worsened, according to their parents' ratings.

The recent British study apparently involved children from the general population with a full range of degrees of socioeconomic backgrounds.<sup>4</sup> The study found that some of the children who were 3 years old or 8 to 9 years old evinced adverse behaviors (as judged by parents and teachers) after exposure to a mixture of dyes and sodium benzoate preservative. This study was remarkable, because a statistically significant effect was found in children in the general population, not just in those suspected of being sensitive to additives. Ideally, this study would be repeated by other researchers.

Food dyes and other ingredients contribute to behavioral disorders in a large, but perhaps unquantifiable number of children. Eliminating those ingredients could mitigate the need for many children to take Ritalin or other stimulant drug. While the costs, in terms of time, money, and possible psychological harm, of taking the drugs is significant, another, less-recognized concern comes from a 1995 government (National Toxicology Program; NTP) study that found that methylphenidate (Ritalin) caused liver tumors in mice (but not rats).<sup>5</sup> Females developed benign liver tumors (hepatocellular adenomas), while males developed both benign and malignant (hepatoblastomas) liver tumors. Unlike many animal studies that have been criticized because of the extraordinarily high dosages that were used, the dosage of methylphenidate that caused cancer in the NTP study was as little as 2.5 times higher than the maximum recommended dose in humans.<sup>6</sup> (In another NTP study, amphetamine did not cause tumors in animals.) For those various reasons, it makes sense to minimize the need for children to take Ritalin. As Samuel Epstein, professor of occupational and environmental health at the School of Public Health at the University of Illinois, said, "The NTP study sends a strong warning that Ritalin may cause cancer—in the liver or other organs—in humans. Millions of young children take Ritalin for years on end, and children may be especially vulnerable. It would be prudent

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<sup>2</sup> Pollock I, Warner JO. Effect of artificial food colours on childhood behaviour. *Archives of Disease in Childhood*. 1990;65:74-7.

<sup>3</sup> Carter CM, Urbanowicz M, Hemsley R, et al. Effects of a few food diet in attention deficit disorder. *Archives of Disease in Childhood*. 1993;69:564-8.

<sup>4</sup> McCann D, Barrett A, Cooper A, et al. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *Lancet*. 2007 Sep 5; [Epub ahead of print].

<sup>5</sup> Dunnick JK, Hailey JR. Experimental studies on the long-term effects of methylphenidate hydrochloride. *Toxicol*. 1995;103:77-84.

<sup>6</sup> The 2.5 times figure is based on a mg/m<sup>2</sup> basis and 1 mg/kg dose in humans; the dose was about 60 times the maximum dose on a mg/kg basis. *Ibid*.

for the FDA to discourage doctors from prescribing Ritalin as the first choice of treatment for ADHD.”<sup>7</sup>

While it is impossible to estimate how many children are affected, the harm can be so significant that there is no excuse for the continued use of questionable additives. It is terribly unfortunate that the food industry has not used the past three decades to develop new recipes without the questionable additives. It seems that industry will act only when government or litigators force change.

I believe that the overall body of scientific literature demonstrates that food additives and ingredients cause behavior problems in a minority of children. The challenge is to devise policies that would protect children from those adverse effects. These responses to the committee’s five questions suggest some possible courses of action:

1. The FDA and other federal agencies have shown no interest whatsoever in protecting children from additives that trigger adverse behavior. I am not aware of any city or state government that has done anything on the issue, though some school systems might have eliminated the use of dyes in school meals. In 1999, we sent our review to the FDA, National Institute of Mental Health, and other agencies, but did not receive any response.
2. Numerous studies, including, but hardly limited to, the recent British study, demonstrate that some children exhibit behavioral abnormalities after they consume certain dyes, preservatives, and other ingredients.
3. Food dyes are certainly non-essential. They are often used to simulate the presence of fruit ingredients in nutrient-poor processed foods and beverages. Such products generally have limited nutritional value, consisting primarily of refined sugars, artificial colors and flavors, preservatives, water, and/or starch. The nation’s health would not be worse off if all those foods disappeared from the marketplace. The same may be said for many foods preserved with sodium benzoate, though it is conceivable, though unlikely, that that is the only preservative that can be used in certain foods.. However, the “baby,” or the candy in this case, does not need to be thrown out with the bathwater. Safe, natural colorings are available for most, if not all, purposes, and manufacturers could make such substitutions.

Currently, few parents (or teachers) know about the possible effect of additives on their children’s behavior. They are unwittingly harming their children (and their family life) when they give them foods and beverages containing those chemicals. For parents who are aware of the problem and are trying to protect their children from certain ingredients, life is difficult, because foods and beverages to be avoided are everywhere. It is very difficult to keep their children from eating or drinking those products. The obvious solution to that problem is for

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<sup>7</sup> Pers. Comm. May 27, 1999.

manufacturers to replace the unnecessary and potentially harmful ingredients with safe ones.

4. The only labeling that indicates the presence of dyes, preservatives, and other ingredients is the ingredients panel on the sides of packages. The print is small, and most people don't wade through the numerous ingredients on many packages. The fronts of packages don't have prominent disclosures that the foods contain artificial colorings or preservatives.
5. To make progress on this issue, where abundant scientific evidence demonstrates that some children are adversely affected by dyes and other added substances, we recommend that this committee, the legislature, or New York State do the following:
  - Bar the presence of artificial colors, flavors, and sodium benzoate from foods distributed in any facilities that receive state funding, such as public schools, orphanages, and juvenile detention residences. (Though some children are also affected by wheat, milk, and other natural foods, it would be impractical to remove those substances from foods.)
  - Urge food manufacturers and restaurants to voluntarily remove artificial colors, flavors, and sodium benzoate from candies, sugary breakfast cereals, soft drinks, and other foods marketed to and consumed by large numbers of children. It is worth noting that the chair of the British Food Standards Agency (FSA), Deirdre Hutton, has expressed her "astonishment that industry has not moved more quickly to remove these artificial colors from their products."<sup>8</sup>
  - Direct the New York State Department of Health to prepare and distribute widely a pamphlet describing the adverse impact of food additives on some children.
  - Direct the New York State Department of Health to prepare a list of ingredients that would not be permitted in foods marketed in New York. Alternatively, the Department could require a warning notice on children's foods marketed in New York that contain ingredients that adversely affect the behavior of some children.
  - Call on the U.S. Congress to direct the Department of Health and Human Services to develop a plan to protect children from adverse behavioral effects of food additives.

Thank you for considering these views.

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<sup>8</sup> Halliday J. FSA quizzes industry on additive removal plans. FoodNavigator.com. Oct. 12, 2007. [www.foodnavigator-usa.com/news/ng.asp?n=80540-fsa-additives-hyperactivity](http://www.foodnavigator-usa.com/news/ng.asp?n=80540-fsa-additives-hyperactivity) (accessed Oct. 27, 2007).