Hyperkinesis and Learning Disabilities Linked to Artificial Food Flavors and Colors

The author reports a rapid improvement in behavior and learning abilities in H-DL children following dietary management eliminating artificial food colors, flavors, and naturally occurring salicylates. Preliminary work in several research programs now under way confirms his observations which, if proven, will offer hope to many troubled children and parents.

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Hyperkinesis and learning disabilities (H-LD) affect millions of children throughout the world.

Hyperkinesis (hyperactivity) is not a precise and distinct clinical entity but, rather, a constellation of signs and symptoms. While there are many characteristics of this behavioral disorder, the disturbance is commonly labeled the "hyperkinetic syndrome" or the "hyperkinetic impulse syndrome," since hyperactivity is usually the dominant feature. Some children, however, are not hyperactive and their conditions may be labeled by any one of several titles(1).

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All the characteristics listed in the terminology table are not usually observed in any one child. More commonly, a child presents an individual mosaic of these features. Not only do patterns vary from child to child, they may also change from day to day and at times even from hour to hour. The great variability and lability of the clinical picture has defied attempts to organize its manifestations into homogeneous patterns to correlate them with a specific etiology which would permit a more precise diagnosis and rationale for management.

***This symbol** is being recommended for food and beverage packages.*

The term hyperkinesis was coined about 1957, but the clinical pattern has been reported in medical literature as far back as 400 B.C. Throughout the Middle Ages and as recently as the early twentieth century, behavioral disturbances labeled "Tanzruh" (dance mania), St. Vitus' dance, and chorea minor are suggestive of the hyperkinetic syndrome. It is interesting to note the similarity of the description of chorea minor by Hempleman in Abt's *Pediatrics* and by Gibson in Brenneman's *Practice of Pediatrics* to that of hyperkinesis(2,3).

The encephalitis epidemic following World War I left in its wake a high incidence of brain pathology. The clinical pattern associated with this brain damage as described by Kahn and Cohen is quite similar to what today is labeled the hyperkinetic syndrome(4). On the basis of these observations it became common practice, even in the absence of demonstrable brain pathology, to attribute similar symptoms in any child to organic brain damage. The studies of Strauss and his associates through the 1950's abetted this practice(5).

Considerable overlapping of terms describing this condition has added confusion in the literature accumulated during this period. As recently as February 1973 a prestigious panel on Minimal Brain Dysfunction (MBD) sponsored by the New York Academy of Sciences resolved nothing(6).

Hyperkinesis is still not understood despite the tremendous volume of basic research and clinical observa-

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tions on it. The only advance made during the past 10 years has been the recognition that the hyperkinetic syndrome does not necessarily indicate organic brain damage. This has led to abandoning such terms as brain damage and neurological damage and substituting the milder term minimal brain dysfunction as an umbrella encompassing practically all of the 38 categories listed on page 799.

Incidence of Learning Disabilities

The inability to classify the heterogeneous clinical patterns into homogeneous syndromes with specific etiologies has also contributed largely to the lack of precise figures for the incidence of H-LD. Figures for its incidence in school children range from a low of 5 percent to a high of 28 percent(7). The State of California Department of Education makes available special learning facilities for 2 percent of the school population. But, in actuality, no school district in California has less than 5 percent of its population using these facilities. The situation is not limited to students in elementary and secondary schools, but involves college students as well. At the DeAnza Junior College in Cupertino, California, 20 percent of the entering freshman class in 1973 had a reading level below the fifth grade(8).

The orientation of the observer—whether a parent, a teacher, a psychologist, or a physician—influences the interpretation of the children's behavior and influences statistics for incidence accordingly. Psychiatrists' figures, for example, cite an average of 4 to 10 percent of school children as being involved while educators cite 15 to 20 percent.

Estimates indicating an increased incidence of hyperkinesis and learning disabilities are frequently challenged by those who claim the increase should be attributed to greater awareness of the problem rather than actual incidence. Among parents, teachers, educators, and other professionals working with children, the concensus not only favors an actual increase but supports a progressive growth in the number of children who have become involved with the H-LD disorder.

CHARACTERISTICS OF HYPERKINESIS-LEARNING DISABILITIES

- Marked hyperactivity and fidgetiness
  - rocks—jiggles legs
  - dances—wiggles hands
  - infant rocks crib and bangs head
- Compulsive aggression
  - disruptive at home and school
  - compulsively touches everything and everybody
  - cannot be diverted from an action
- Excitability—impulsiveness
  - behavior is unpredictable
  - panics easily
  - has temper tantrums when frustrated
- Low tolerance for failure and frustration
  - demands must be met immediately
  - cries often and easily
- Short attention span
  - flits from one project to another
  - is unable to sit through a school period, a meal, or a TV program
- Exceptional clumsiness
  - poor muscle coordination
  - eyes and hands do not seem to function together
  - has difficulty buttoning clothes, writing, drawing, and during playground activities
- Poor sleep habits
  - difficult to get to bed, hard to get to sleep
  - awakens easily
- Cognitive disturbances
- Perceptive disturbances
- Normal to high IQ but fails at school

In establishing data for the incidence of H-LD in schools, consideration must be given to the so-called "crowding syndrome" of experimental animal psychology. In these studies rats confined to a limited space were found to develop increased activity and aggression. This increased aggression correlated with an increased concentration of serotonin in the brain, considered an indicator of aggression(9). Teachers have observed similar responses among children in a crowded classroom. With one or at the most two hyperkinetic and aggressive children in a classroom, not only do the normal children develop a higher level of activity and expression of aggression but even the teacher becomes hyperactive.

Other factors which affect incidence are the family's socio-economic status and ethnic origin and environmental influences, which include food additives and, more specifically, artificial colors and flavors.

The growth of H-LD coincides with the rapid increase in the use of synthetic colors and flavors in our food supply. A graph of the estimated incidence of H-LD over the past 10 years parallels Standard and Poor's curves for the dollar value for soft drinks and synthetic flavors over the same period. This increase has been particularly noticeable since World War II and especially during the past decade. The forecast for the future is suggested by Senator Gaylord Nelson (D., Wis.) who places the present dollar value for this industry at $500 million with a 1980 estimate at $750 million.

Reactions to Additives

I believe that it is more than suggestive that a relationship exists between H-LD and the artificial colors and flavors in our food. No great imagination is required to visualize how this critical medical and social problem will be compounded within the not too distant future unless recognition is given to the important causative role of the additives.

The precise number of additives used in our food supply is not

known. A compilation in 1965 by the Food Protection Committee of the National Research Council and the National Science Foundation lists 2,764 chemicals in 13 categories(10). However this list has grown so that current estimates place the number in excess of 3,800.

Here, I am concerned only with two categories: the artificial colors and flavors which make up roughly 80 percent of all the chemicals used in our food supply.

Over the past 20 years, adverse reactions affecting practically every body system have been attributed to artificial colors and flavors(11). This, however, does not imply that the remaining 11 categories of food additives do not cause adverse reactions. Actually, any chemical compound can cause an adverse reaction but, fortunately, reactions to some essential additives are not common. For example, the frequency of reactions to food preservatives is not sufficient to offset the benefits derived from them. With synthetic colors and flavors, the situation is quite different. They are a common cause of adverse reactions affecting most body systems and they have no nutritional value. They are not essential as they are used merely for cosmetic or esthetic effects. The risks in their use outweigh the benefits.

The most important and most dramatic adverse reactions induced by synthetic colors and flavors are behavioral disturbances. We know that any chemical compound, natural or synthetic, has the potential to produce an adverse response in a susceptible individual. We know that both drugs and food chemicals are low molecular compounds. We also know that drugs can influence the behavior of animals and men. Accordingly, it is reasonable to expect food chemicals to cause behavioral modifications. And with the thousands of food chemicals in the environment, it seems remarkable that their influence on behavior has not been suspected sooner.

Although my initial observation of a behavioral disturbance attributable to artificial colors and flavors was in an adult female, my current observations have been limited to children(12).

Nature and Characteristics of H-LD

Hyperkinesis and learning disabilities cover a range of ages from early infancy through adolescence and into adulthood. In early infancy, restlessness, head banging, crib rocking, and sleeplessness are the dominant features. Invariably there is a history of the infant's having been given artificially colored and flavored pediatric vitamin drops.

At nursery school and kindergarten age, impulsiveness and aggression become apparent, but usually not until the first and second school grades does the fully developed pattern become evident. Having a short attention span coupled with impulsiveness and aggression, the child is propelled every few seconds from one activity to another, frequently with the accompaniment of incessant jabbering. This behavior disrupts the classroom and disturbs both peers and teacher.

The constellation of characteristics persists through puberty into adolescence and at times even into adulthood. Not infrequently as the child passes through puberty, the hyperactivity may diminish or completely fade out. The remaining characteristics with their potential for antisocial behavior, lying, and stealing, may persist. It is this evolution of the pattern that supports the growing tendency among educators, psychologists, psychiatrists, and law officers to attribute the rising incidence of antisocial behavior, delinquency, and criminality among adolescents and young adults to hyperkinesis in childhood.

Although many hyperkinetic children are bright, they frequently fail at school. This surprises the parents and frustrates the child. Parental surprise may derive from a difference in the child's behavior at home and at school where the child must contend with a structured classroom environment, the need to learn, and the competition with peers. The child's frustration ensues from his inability

VARIOUS DIAGNOSES ASCRIBED TO H-LD CHILDREN

GROUP I ORGANIC TERMINOLOGY	
association deficit pathology	minimal cerebral palsy
cerebral dysfunction	minimal chronic brain syndromes
cerebral dys-synchronization syndrome	minor brain damage
choreiform syndrome	neurophrenia
diffuse brain damage	organic behavior disorder
minimal brain damage	organic brain damage
minimal brain injury	organic brain disease
minimal cerebral damage	organic brain dysfunction
minimal cerebral injury	organic drivenness

GROUP II SYMPTOMATIC TERMINOLOGY	
aggressive behavior disorder	hyperkinetic behavior syndrome
aphasoid syndrome	hyperkinetic impulse disorder
attention disorders	hyperkinetic syndrome
character impulse disorder	hypokinetic syndrome
clumsy child syndrome	interjacent child
conceptually handicapped	learning disabilities
dyslexia	perceptual cripple
educationally handicapped (California State Legislature AB464)	perceptually handicapped
hyperexcitability syndrome	primary reading retardation
	psychoneurological learning disorders
	specific reading disability

Experience to date indicates that almost 50 percent of children with H-LD respond to elimination diets.

to perform to the full level of his competence. Consequently, as these children approach adolescence, they are frequently withdrawn and suffer from a low self-esteem.

It is important to recognize that this entire behavioral pattern is beyond the child's voluntary control. He does not choose to be a failure nor does he want to be bad. It is as though something within is driving him. He is like a revved-up motor with the throttle stuck. Discipline achieves nothing but invites rebellion and further frustration, precipitating displays of temper and tantrums.

CHEMICALS USED IN FOOD PROCESSING

antioxidants	28
bleaching and maturing agents	24
buffers, acids, alkalies	60
food colors	34
flavors, natural	502
flavors, synthetic	1,610
non-nutritive and special dietary sweetners	4
nutritive supplements	117
preservatives	33
sequestrants	45
surface active agents	111
stabilizers, thickeners	39
miscellaneous: yeast foods, texturizers, firming agents, binders, anticaking agents, enzymes	157
TOTAL	2,764

Since 1972, five separate dietary programs have been conducted with 194 H-LD children. The children were given a diet eliminating all artificial colors and flavors and all foods containing a natural salicylate radical. Favorable reports have been received about children on dietary management from various parts of the country as well as from England, Canada, Australia, and France. A study funded by the National Institute of Education will involve a double-blind cross-over study on 100 children under the direction of Dr. Keith Conners, department of psychiatry, University of Pittsburgh, Pa. Although the final data on this study are not available, preliminary observations on a pilot group of 12 boys validate the relationship of artificial colors and flavors to behavioral disturbances.

The experience to date indicates that approximately 50 percent of children with H-LD respond to strict elimination diets. Loss of hyperactivity, aggression, and impulsiveness are the initial changes observed. This is soon followed by improvement in muscular coordination as indicated by improved writing and drawing abilities, greater facility with speech, and loss of clumsiness. Disturbances in cognition and perception are usually the last to respond. With an increased attention span which permits greater concentration, scholastic achievement improves rapidly.

Age seems to be an important determining factor in the degree and speed of response to dietary management. The younger the child, the more rapid and more complete is the improvement. A 3 or 5-year-old child may show improvement as early as the third day of dietary control. Beyond this age period, two to three weeks of strict dietary management are usually necessary before a decided improvement occurs. In the adolescent, 15 years of age and older, the response is not only slower, but frequently less complete or shows little improvement. In the older child and adolescent, the motor disturbances, for example, impulsiveness, aggression, and hyperactivity, may be controlled with diet, but the lack of improvement in cognition and perception interferes with learning abilities. This failure leads to frustration, withdrawal, and loss of self-esteem which may be followed by antisocial behavior. The highest percent of behavioral failures is seen in late childhood and in adolescence.

Children who have been on behavior-modifying drugs for years usually can discontinue them. Ordinarily, it is advisable to stop all medications within 24 to 48 hours after starting the elimination diet. When the diet is effective, such stimulants as amphetamines and methylphenidate HCl (Ritalin)—may lose their paradoxical effect and this may lead to an aggravation of the behavioral pattern. For some children, the small amount of dye coating the tablet may be sufficient to induce hyperactivity. Children under treatment with dextroamphetamine spansules, a long-acting drug, may require up to 40 days of dietary management before a favorable response is observed.

Such stimulants as amphetamine and Ritalin; the tranquilizers, trifluoperazine HCl (Stelazine) and thioridazine HCl (Mellaril); and the antidepressants, amitriptyline HCl (Elavil) and imipramine HCl (Tofranil), are frequently prescribed for management of the H-LD child. At

ADVERSE REACTIONS ATTRIBUTED TO SYNTHETIC FLAVORS AND COLORS

Gastrointestinal
- buccal chancres
- constipation
- flatulence and pyrosis
- macroglossia

Neurological
- behavioral disturbances
- headaches

Respiratory
- asthma
- cough
- hoarseness (laryngeal nodes)
- laryngeal edema
- nasal polyps
- rhinitis

Skeletal
- arthralgia with edema

Skin
- angio-edema
- dermatographia
- localized skin lesions
- pruritus
- urticaria

best, drug therapy is only a palliative measure. It neither cures the child nor corrects the cause of the behavioral disturbance. In most patients, medications control the obvious symptoms of hyperactivity, aggression, and impulsiveness but have no effect on the psychological deficits. There are no long-term controlled studies yet to demonstrate that drug therapy over extended periods is without risk.

Any infraction of the diet, either inadvertent or deliberate, causes a recurrence of the complete behavioral pattern within two to four hours which persists for one to four days. Accordingly, the child who ingests a restricted item on Monday and again on Thursday will have a persistence of symptoms.

This ability to "turn on" and "turn off" the behavioral pattern suggests that the underlying disturbance is not organic damage. Specific data concerning the underlying involvement is lacking; however, since food

The Nurse Practitioner and the Child on the Feingold Diet

In successful management of the Feingold diet, the nurse practitioner can play an important role. This we have learned in our work with hyperkinetic children.

Initially, the child is evaluated by a physician. Once eligibility for dietary management is determined, the child is referred to a nurse practitioner for direction and supervision.

Prior to the initial visit with the nurse, the parents are instructed not to change the child's eating habits and to keep a diet diary for about 7 to 10 days. The diary should accurately describe all foods, beverages, and medications for each meal and all snacks.

At the initial visit, the nurse reviews the current diet with both parents and child before she begins the instructions for the Feingold diet. If the child is old enough to understand the importance of dietary management, the instructions are directed to him. Although ultimately the program's success depends upon the child's full cooperation, in some cases this cannot be expected until the diet becomes effective. Until the child is controlled, he may not be able to comply. Very often he is unable to control his behavior even when he tries. This aspect of the behavioral pattern is important to recognize. It is during this initial period of about 10 to 14 days that the parents must have complete understanding of the child's inability to comply and must watch him carefully. A single infraction in the diet can cause an almost immediate return of the behavioral disturbance.

In most instances, success requires that the entire family be on the diet. The absence of prohibited foods from the home eliminates temptation and the risk of infractions. In addition, when the entire family complies, the child does not have a sense of inferiority, nor does he feel that he is being discriminated against. A spin-off is the elimination of items that could be injurious to the health of other family members as well.

The dietary program requires careful reading of all labels and avoiding any that say "color added," "certified color," or "flavoring." Making a game of this and also involving the child in the preparation of the food help maintain interest in food selection.

For school the child should be provided with a bag lunch. Most school lunch programs at present have a number of forbidden items on every week's menus. For the preschool child, a bag with snacks should be provided. It is also important to inform the teacher so she can keep anyone from offering the child forbidden items.

Generally, all medications are discontinued.

Many of the children, even the very young, cooperate and watch the diet carefully, sometimes more so than their parents. We have found that on the Feingold diet, the child discovers that he feels better. He wants to be good, and he is able to be good. He is calmer, relates better to young and old. He is more attentive, less easily frustrated, which means no tantrums. Because he is happier, the entire family environment is more serene. All these changes are reflected in better adjustment at school and marked improvement in scholastic achievement.

After two to three weeks on the diet, the parents and child are interviewed for a follow-up evaluation which is repeated every month or six weeks until the dietary routine is established.

A parent and teacher questionnaire, furnished at the time of the first visit, is completed and submitted at the follow-up appointment. These questionnaires serve as a guide for the child's progress both at home and at school.

If, after four to six weeks, the response is favorable, then consideration can be given to reintroducing food items in Group I, which consist of the fruits and vegetables with natural salicylates (see chart, p. 803). Aspirin sensitivity is rarely observed clinically in the child. In the absence of symptoms, a history of aspirin sensitivity in the family, particularly in a parent, means that caution should be exercised in starting with these foods. Since tomatoes are reported to contain the highest concentration of salicylates, this food should be tried first. If the child prefers some other food item, it is permissible to start with the item of his choice. One by one, each food item is tried for about 3 to 4 days. If nothing adverse is observed, they may be continued routinely. The items in Group II must always be excluded.—BILLIE BOLDEN, *R.N., PNP, Kaiser Permanente Medical Center, San Jose, Calif. and* ADA SHANNON, *R.N., PNP, Kaiser Permanente, Santa Clara, Calif.*

With millions of H-LD children in this country the problem is obviously one of epidemic proportions.

additives and drugs are both low molecular weight chemicals, it is reasonable to draw upon the experience with drugs for guidelines.

We can refer to the observations in the field of pharmacogenetics for an interpretation of the adverse reactions to colors and flavors. Pharmacogenetics, a comparatively new discipline, studies the behavior of drugs in the body on the basis of the genetic profile of the individual. Examples of adverse reactions to drugs can serve to interpret the genetic variation that may be involved in adverse reactions to food chemicals.

Zurich hemoglobinopathy, for example, is a disease of the hemoglobin dependent upon a genetic variation that occurs on the beta chain of the hemoglobin molecule. The only change is the substitution of the amino acids arginine for histidine, which is normally present at the 63-position of the beta chain. Individuals with such a substitution are normal unless they encounter an oxidant drug like sulfanilamide. Then they experience damage to their hemoglobin which can be fatal. It is conceivable that in a similar manner individuals with adverse reactions to food chemicals have a genetic variation which make them susceptible to food chemicals.

Another important example is the experience with isoniazid (INH), the drug used for treatment of active tuberculosis. The population receiving this drug is divided into two large groups. Approximately, 60 percent of the group metabolizes or breaks down INH very rapidly so that treatment causes no ill effects. On the other hand, the remaining 40 percent are slow metabolizers of the drugs so that it accumulates in the body causing toxic reactions. This suggests that any genetic predisposition explaining the adverse reaction to colors and flavors may be widespread to account for the millions of individuals who seem to be involved.

A third observation, the Lesch-Nyhan syndrome, is important in interpreting the behavioral disturbances associated with food colors and flavors. The Lesch-Nyhan syndrome, associated with uncontrollable aggression, is a disturbance of uric acid metabolism based upon a mutation on the X, or sex, chromosome, which limits its involvement to males. The seven-to-one predominance of H-LD in boys over girls suggests that this behavioral disturbance may be associated with a mutation on the X chromosome. The unbridled aggression observed with the Lesch-Nyhan syndrome is in many respects similar to the uncontrollable aggression and impulsiveness observed in H-LD.

Elimination Diet

My clinical interest was initially concerned with adverse reactions to drugs and adverse reactions to artificial colors and flavors.

Because it is widely used, reactions to aspirin are quite common. In managing the aspirin-sensitive patient we observed, as have many other investigators, that discontinuing aspirin did not always lead to a clinical response. About 15 years ago we learned that a number of foods contain a natural salicylate radical which, although not identical with aspirin in structure, is similar. On the basis of this observation, we constructed a diet eliminating all foods containing a natural salicylate radical and seven artificial flavors that contain a salicylate radical, for example, mint. This diet led to increased, but not complete, success in the management of the aspirin-sensitive patient.

Next we, as well as a number of clinicians about the country, observed that aspirin-sensitive patients were also intolerant to tartrazine (Food, Drug and Cosmetic [FD&C] yellow #5), a common dye in our foods, beverages, and medications. Aspirin-sensitive patients react to tartrazine and tartrazine-sensitive patients react to aspirin, although aspirin and tartrazine have no chemical structural similarity. On the basis of this observation, we eliminated from the diet all items containing tartrazine, all foods with a natural salicylate radical, and flavors with salicylates. Again we observed improvement in the dietary management of the aspirin-sensitive patient.

Next, Vane and Ferreira reported that aspirin and indomethacin inhibit the in vitro synthesis of prostaglandin PG E_2, a mediator found in many body tissues (13-16). Aspirin-sensitive patients react to indomethacin and vice versa. Again, aspirin and indomethacin have no chemical structural relationship.

The cross reactions observed clinically with aspirin, tartrazine, and indomethacin led to the hypothesis that among the several thousand colors and synthetic flavors in the food and drug supply there might be other chemical compounds which, although not related structurally, might induce identical adverse clinical responses. Accordingly, a diet was planned that eliminated all foods with a natural salicylate radical and all synthetic colors and flavors. This

RESPONSE OF CHILDREN TO DIETS ELIMINATING SYNTHETIC COLORS, FLAVORS, AND NATURAL SALICYLATES

	#			%	%
Program	*Children*	*Dramatic*	*Favorable*	*Response*	*No Response*
I	100	40		40	60
II	33	4	15	57	43
III	25	4	12	64	36
IV	25	4	6	40	60
V	11	6	2	73	27
TOTAL	194	58	35	48	52

is the diet prescribed for children with H-LD and all other persons with adverse responses attributable to artificial colors and flavors.

The mechanism by which the chemicals cause the adverse reaction is not known. Several hypotheses have been proposed but none has been confirmed. However, there is general agreement that the adverse reactions to food chemicals are not allergic in nature.

Because the causative mechanism is unknown, there are no tests to determine an individual's intolerance to food chemicals. In view of the several thousand chemicals involved and the possibility of cross reactions, a compound-by-compound identification is impossible. Therefore, dietary management for adverse reactions to synthetic colors and flavors is purely empirical, a not uncommon medical practice in the administration of drugs. The precise mechanism involved in the action of most drugs is not known. For example, little is understood about aspirin's effect in the body. Hypotheses are suggested, but there is no absolute or precise understanding of how the drug operates.

Although the diet is simple, a parent's initial reaction is often one of bewilderment and apprehension—bewilderment because of the high incidence of artificial colors and flavors in our processed food supply and apprehension because of a fear that very little may be available to eat (17). Actually, the diet is extremely liberal and nutritious. Except for the fruits and two vegetables with natural salicylates, no food is prohibited provided it contains no artificial colors or flavors. This may require careful reading of labels at first, but soon the parent and, at times, even an older child learn that many permissible foods are available on the market. Some foods like pies, cookies, cakes, pastries, candies, and ice cream may have to be prepared at home to insure their freedom from artificial flavors and colors.

In the pediatrics department of the California Kaiser-Permanente Medical Center, Santa Clara, a program for the care of the H-LD child who has been diagnosed by a physician is under the supervision of nurse practitioners. This experience has been very successful.

The millions of H-LD children in this country afford nurses and particularly school nurses and nurse practitioners in clinics and in the physician's offices an exceptional opportunity to apply their skills toward correcting a problem of epidemic proportions.

Investigation of the food supply in the community will reveal sources of all types of permissible foods. It is usually not necessary to rely on the health food shops. The information gathered added to a few menus and recipes can be extremely helpful to a parent in the early weeks of management. A program of strict dietary adherence should be rewarding in about 50 percent of the H-LD children. Once a favorable response is observed, both parents and child become aware that not only the cause for the behavior is known, but that a cure is available, too.

Most children are pleased to adhere to a diet which avoids the need for medication and helps them to adjust both at home and at school so that they can perform to their full potential. Since they are bright children, they are very soon listed in the upper percentile of their classes.

To expedite shopping a symbol has been recommended to appear on all food and beverage packages to indicate the complete absence of artificial colors and flavors. Such a program would place no restrictions or prohibitions upon the food processor and manufacturer. According to the Food and Drug Administration, nothing in the Food, Drug and Cosmetic Act would prohibit use of such a symbol.

FOODS CONTAINING NATURAL SALICYLATES

almonds
apples (cider & cider vinegars)
apricots
blackberries
cherries
cloves
cucumbers and pickles
currants
gooseberries
grapes and raisins (wine & wine vinegars)
mint flavors
nectarines
oranges
peaches
prunes, plums
raspberries
strawberries
tea, all varieties
tomatoes
oil of wintergreen

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