Mike got quite a few votes for his 40 percent cut at least partly because everybody like Mike Mansfield, a new and independent Senator, who didn’t go through the long battle to establish American power in Europe and Asia, thinks the detente with Moscow and Peking is a reality instead of merely an experiment.

Somewhere in this debate, there has to be a common denominator, a leader, who wants nothing less than a 40 percent cut in the overseas forces and the Administration forces to keep force levels overseas where they are.

The Administration won this latest battle with the Senate, and can probably keep on winning with the House, at least for a while. But the mood of retreat on the Hill is getting stronger all the time, and the confidence between the White House and the Congress, after Vietnam and Watergate, is getting weaker all the time. And this is a problem, particularly since the Administration is trying to negotiate a strategic arms limitation with the Soviets, and to negotiate with the Allies on the future of the NATO Alliance, with the Soviet Union on the basis of reduced forces of both Soviet and U.S. forces in Europe.

This the Senate knew, but it voted for a 40 percent cut anyway, and reversed itself only when the White House made it clear that the vote was made clear later in the day. In the end, the arguments of the Administration prevailed. But it is not likely to happen again, and there may be fewer votes were switched, not by the arguments of the White House, but by the arguments of foreigners, the two eloquent voices out of Moscow, appealing to the United States not to make one-sided deals with the Soviet Union, without making some compromise concessions from the Communist side.

Another “guns or butter” debate is warming up in Congress with consideration of a $30 billion military procurement bill. Once again, we are caught up in the difficulty of reconciling our political process with the needs of national security. While politicians and personalities can change the relative power or weakness of different points of view in Congress, these conditions have nothing to do with the number of men and weapons actually necessary to defend our country.

Congressional doves may no longer cry for an end to the Viet Nam War as a means of producing billions to be spent on domestic programs. This leaves only the defense budget as the major target for reduction. The idea that military spending in the neighborhood of $50 billion is too much in “peace-time” is becoming dangerously popular with senators and representatives whose favorite programs are waiting to be funded but cannot be fitted into the federal budget under the ceiling which President Nixon is determined to maintain.

The Senate Armed Services Committee has concluded that the army’s 156,000 men from our armed forces. This would reduce them even lower than the 2.2 million level projected by the Defense Department after a series of base closings and consolidations of military units announced earlier this year. The argument that these new reductions would be for force reduction rather than combat forces simply ignores the balanced relationship which must exist between the combat logistics and communications network that must back him up if he ever has to fight.

The axe is falling on the funding for such long-range weapons development programs as the B-1 bomber and the Trident missile submarine. The argument here seems to be that money will certainly flow without running out these advanced weapons, and since detente in the air, we need be in no hurry to develop them. This assumes that the Soviets are not building new and improved versions of their strategic weapons. We know, however, that just the opposite is true. The Soviets are now pouring resources at an unprecedented scale into improving both their strategic and tactical forces.

The level of U.S. troops stationed in Europe and South Korea is now at its highest level in years. It cannot be if we expect any resolution of the current effort to negotiate a mutual security understanding in Europe and the Atlantic Treaty Organization and the Warsaw Pact. A unilateral troop reduction by the United States of America would only undercuts Nato’s bargaining position.

President Nixon has made the point that domestic programs will be meaningless if we fail to maintain adequate military strength. Put in simplest terms, if a country does not have enough guns to defend itself from an enemy, having butter on the table will not save it. With the Defense Department’s buying power seriously eroded by inflation, the defense budget is the last place Congress should be looking for money to divert to new domestic spending. The fat just isn’t there to be trimmed.

**FOOD ADDITIVES AND HYPERACTIVITY IN CHILDREN**

Mr. BEALL. Mr. President, since early this year I have been in communication with Dr. Ben F. Feingold, chief-ameritus, department of allergy of the Kaiser Foundation Hospitals and Permanente Medical Group, with respect to hyperactivity, or hyperkinesis, or hyperactivity.

This is a problem which is conservatively estimated to involve 3 percent of the elementary school population of our country. However, the incidence of hyperkinesis varies greatly from community to community. For example, in San Francisco a conservative estimate indicated that 5 percent of all pupils were hyperactive, while in Monroe County, New York, the estimate is as high as 25 percent. The California Association for Neurological Handicapped estimated in the past 10 to 12 years a 40 to 50 percent increase in the incidence in population.

Dr. Feingold’s research has indicated a possible link between hyperactivity in children and the growing use of food additives. By placing children on a diet that is free of artificial food flavors and colors, Dr. Feingold has been able to achieve dramatic results. Even more dramatic was the ability to trigger a return of hyperactivity, sometimes in a matter of minutes, by introducing artificial substances back into the diet.

At the present time many hyperactive children are being treated with drugs. If hyperactivity can be controlled simply by changing a child’s diet, we certainly should find it preferable to move in that direction. And if there is a link between artificial food additives and hyperactivity, then the entire use of artificial colors, flavors, and other additives must be examined.

Mr. President, next month the Senate Labor and Public Welfare Subcommittee on Health will be holding hearings in the District of Columbia. I believe you are very busy today, in view of the importance of...
The child goes off to school where, at lunch, he gets more flavoring and colorings in hot dogs, luncheon meats, ice cream and beverages rather than milk.

"Is it any wonder our children are jumping and falling to learn?" Feingold asked at the AMA session.

The conscientious consumer, or school authorities, may try to cope with the positively chemically-created disorder by doing the same thing with more chemicals and such as softdrink powders, the physician says.

Feingold reported initial findings to an American Medical Association meeting in New York City in June at an international food symposium in London in September. He said in a phone interview with The Washington Post that he is now preparing an article for the British Medical Journal, published by the British Medical Association.

At the time of the AMA meeting, Feingold said, he had achieved "dramatic results" with the special diet in 16 to 28 of 26 hyperactive kinetic children in his practice. Some of the children who did not improve did not stick to the diet, he said.

Currently, the allergist told a reporter, he has successfully treated more than 50 children, and the doctors for the physicians independently have duplicated his results. Feingold emphasized that the special diet doesn't alleviate all the psychiatrically multiple causes of hyperkinesis. Sometimes it works in harness with standard allergy control measures, he said.

Feingold told of a 7-year-old boy who had been hyperkinetic during much of his life. No therapy worked. But after a few weeks on the special diet the boy was well adjusted at home as well as at school.

The physician said that even a slight violation of the diet can cause symptoms of hyperkinesis to emerge within a few hours and to persist for 24 to 48 hours.

"In view of our ability to state this behavioral disturbance in children to food additives by "turning on" and "turning off" these adverse clinical responses," Feingold told fellow allergists at the AMA meeting, "we raise the following question: "Is it possible to attribute the increase in hyperkinesis and learning difficulty ... to the increased consumption of these chemicals in our foodstuffs?"

The disorder, called hyperkinesis or hyperactivity, interferes with a child's attention span—leading to reading, spelling and other learning difficulties—and is reflected in disruptive and even compulsively aggressive behavior.

The disorder occurs almost exclusively in boys. Usually only one child in a family is affected.

Hyperkinetic children generally—but not always—are genetically predisposed to allergies. Usually they have normal or high IQs. And, says Feingold, they ingest substantial amounts of chemical colors and flavors, as shown by diet diaries.

Frequently, physicians prescribe for hyperkinetic children drugs that in adults are stimulants. The drugs are amphetamine salts and Ritalin, the trade-name of the CIBA-Geigy Corp. for methylphenidate hydrochloride.

Feingold has found that sharp increases in the disorder and in learning difficulties over the last 10 years have occurred in parallel with increases in the dollar value of the production of artificial flavors and soft drinks.

There are 2,600 to 3,000 flavors—some of them secret chemical formulations—but only 11 basic synthetic chemicals, Feingold says.

The colors and flavors constitute about 80 percent of all food additives. They proliferate in hundreds of different products, such as softdrink powders, the physician says.

Feingold's research associates were Drs. Ronald F. German, Alice Friedman, Richard Broman and Elliot Ginsburg, Bross, in a related development at Georgetown University, researchers have reported on a laboratory study of some additives used to prevent spoilage of beverages and canned and frozen foods by disease-producing microorganisms.

The additives act as strong antibacterial and antifungal agents, but at the same time anti-cell agents.

Further investigation is necessary, but present evidence would urge caution in eating large quantities of food containing such additives," said microbiologist Thaseppath Sreeravlan.

The study, done in collaboration with the National Institutes of Health, involved tissue cultures in which additives were shown to inhibit the growth of cells, to prevent their shape, and in some cases to destroy them.

The results, reported in the Proceedings of the National Academy of Sciences, also showed that the chemicals did not act selectively merely against the bacteria that cause spoilage, but were at the same time anti-cell agents.

There may be a mechanism whereby the stomach tissue in a whole organism is able to detoxify the compounds in humans, but even in such case, ingesting too much might overload the mechanism and still pose a danger," said Associate Prof. Sreeravlan.

He said that most anti-bacterial food additives are fatty acids that, in the concentrations in which they are used to prevent spoilage, have not exhibited "any gross animal or human toxicity."

All human cells in the study are inhabited by these compounds, as well as by nitrite. For that reason, the large consumption of foods containing the compounds "may actually interfere with the function of some human cells," Sreeravlan said.

The same would apply to drugs such as salicylates—such as aspirin—also that are fatty acids, he said.

The study was done with cells from human liver and intestines and with chicken embryos grown in laboratories.

Sreeravlan's co-researchers were Elliot Ginsburg, Danila, Salomon, and Dr. Ernest Freese.
ADVERSE REACTIONS TO FOOD ADDITIVES WITH SPECIAL REFERENCE TO HYPERSENSITIVITY AND LEARNING DIFFICULTY (II-LD)

By Ben F. Feingold, M.D.*

Foods are mixtures of chemicals, the bulk of which are proteins, fats and carbohydrates. In addition to these basic substances, numerous accessory chemicals occur in foods in varying concentrations. Some of these substances are natural constituents of the food product, while others known as food additives have been incorporated either directly or indirectly during various stages of production, storage and processing. These substances, except for chance contaminants, that incidentally have become a part of food are known as non-intentional food additives, while those that are purposely incorporated are called intentional food additives.

While both the naturally occurring chemicals and food additives may be involved in the health and behavior of man, the scope of this discussion is limited to observations attributed chiefly to artificial flavors and colors.

Classification of intentional additives

Preservatives 38
Antioxidants 28
Sensitizers 45
Surface active agents 111
Stabilizers, thickeners 99
Coloring and flavoring agents 59
Buffering and puffers 90
Food colors 94
Nonnutritive, and special dietary substances 4
Nutritive supplement 117
Flavorings—synthetic 610
Flavorings—natural 802
Miscellaneous: yeast foods, texturizers, firming agents, binders, antiacaking agents, enzymes 157

Total number of additives 2,764

Chief Emetarius, Department of Allergy, Kaiser-Permanente Medical Center, 2200 O'Farrell Street, San Francisco, California 94115

The flavors and colors represent three out of fourteen categories that constitute a list of intentional food additives compiled in 1965 by the Food Protection Committee of the United States National Science Foundation and the National Research Council. (1) This list is important because of the 2,764 chemicals listed in this report, the flavors and colors constitute over 80 per cent of the total.

Colors and flavors make no contribution to the nutritional value of food. However, since both flavor and color are very important factors in consumer acceptance, they are frequently interlinked. As a result, they play identical and important roles in determining the economic success experienced in marketing food products, which in turn may subtly, yet at times very importantly influence the health and behavior of man.

Prior to 1850 when dyes were originally developed from coal-tar derivatives, practically all colors added to foods were of natural origin. (2) However, following the development of synthetic colors, there has been a constant increase in the utilization of synthetic products by the food, drug and beverage industries, so that over two billion pounds of synthetic color materials are added to our food supply annually. This represents over 90 per cent of all the food coloring used, leaving 10 per cent from natural sources. The various synthetic dyes are derived from four basic coal tar derivatives. (3)

BASIC COAL TAR DERIVATIVES

Triphenylmethane

Azo.

Xanthene

Sulfonated indigo.

Test samples from each class have from time to time exhibited adverse effects. Decreases at rates of less than one percent, azo dyes and indigo have known carcinogenic properties, while xanthene products manifest mutagenic potentials.

By 1900, in the absence of regulations, there were approximately 80 dyes used in the United States for food coloring. (4) In many instances dyes from a batch used for dyeing cloth were used for food. By 1950, when the first regulations were instituted in the United States, the list was reduced to seven products, which were considered to be of known composition and studied physiologically.

The short-term evaluation initially applied to the certification of food colors was unreliable with the result that the approved list of colors is constantly undergoing extensive long term testing. Toxicity and carcinogenicity frequently become manifest, which leads to either exclusion or provisional listing. As a result of the short-term evaluation of a new product is substituted. This constant practice of deletion and substitution merely reflects the inherent potential of coal-tar dyes to produce adverse effects—a situation that will not doubt persist so long as coal-tar derivatives are used for food processing.

The deficiencies of short term evaluation are well expressed in a report on food colors issued in the United Kingdom as early as 1954. To quote, "We cannot accept the contention that, because coal tar dyes have been used in foods for many years without giving rise to complaint of illness, they are, therefore, harmless substances. Such negative evidence in our view nowhere attributes the in the amounts customarily used in foods, the colors are not acutely toxic but give no certain indication of any possible chronic (long term, continuing) effects. Any chronic effects would be insidious and it would be difficult if not impossible to attribute them with certainty to the consumption of food containing coloring matter."

The situation with regard to the reliability of colors as expressed in this statement explains in great measure the difficulty various public health authorities are having in writing mutually acceptable regulations for the authorization of colors to be incorporated into food products.

The following table which lists the synthetic colors permitted in several countries illustrates this situation.

SYNTHETIC FOOD COLORS PERMITTED IN SEVERAL DIFFERENT COUNTRIES

Dyes

Great Britain

Australia

Canada

Denmark

Finland

Germany

India

Norway

Spain

Sweden

Switzerland

South Africa

Ponceau 4R

Carmine

Amaranth

Red 10B

Uryrinine

Red 2G

Red 3G

Fast red E

Red B

Orange G

Orange P

Canyellow 6G

Tartazine

Yellow 2G

Sunset yellow FCF

Gill yellow 4G

Orange S

Indigo carmine

Violet BNP

Brown

Chocolate brown BS

Chocolate brown BS

Black PH

Black 78BP

Sulfonated indigo

Blue no. 2 (Indigo Blue)

Azo dyes

Red no. 4 (Ponceau S.X.)

Red no. 40 (Allura Red A.C.)

Cinnurin red no. 1

Orange B

Yellow no. 6 (Tartazine)

Yellow no. 3 (Sunset Yellow F.C.)

The necessity to restrict to a rather limited number the chemicals used for color is added by the fortuitous circumstance that color perception functions through a single organ—the eye, which makes the chemistry and measurement straightforward. Through the psychology and acceptance of color may be complex. As a result, the demands on the industry for a great variety of hues, tints and quality can be met by blending a small number of chemicals.

By the other hand, it is possible to create a composite sensation consisting of the concurrent reactions of the taste and olfactory re-
Initially, it was believed that food additives served as hormones (i.e., complete antigens) to conjugate with body proteins to form complete antigens which have the capacity to evoke allergic tissue reactions. However, the studies on aspirin by Farr (7) and Samiter (8) in the United States supported only the non-immunologic nature of aspirin sensitivity, but emphasized the relationship observed clinically between aspirin intolerance and adverse reactions to Tartrazine (FD & C Yellow No. 5), a widely distributed azo food coloring. The observations of the British toxicologist, Vane (9), strengthened this concept. Vane reported that aspirin and indomethacin, although structurally unrelated, inhibit prostaglandin synthesis, one of the cascading activities of a number of body substances. These observations suggest that the adverse reactions to these drugs could be pharmacologic rather than immunologic in origin.

The next table lists the chemicals contained in artificial pineapple flavor. If the purpose of the flavoring is to reproduce the various flavors occurring in nature, the variety of chemicals that are possible is quite extensive. Many of these chemicals have been commonly used by the food processors, and in some cases, the relationships between the chemicals in the flavoring and their effects on the human body have been well documented. The table lists only those of the flavoring that have been identified as contributing to the flavor of the food product.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl caproate</td>
<td>5.0</td>
</tr>
<tr>
<td>Isoeptol acetate</td>
<td>3.0</td>
</tr>
<tr>
<td>Isoeptol isovalerate</td>
<td>3.0</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>2.0</td>
</tr>
<tr>
<td>Ethyl butyrate</td>
<td>2.2</td>
</tr>
<tr>
<td>Terpinyl propionate</td>
<td>2.5</td>
</tr>
<tr>
<td>Ethyl crotonate</td>
<td>5.0</td>
</tr>
<tr>
<td>Capsule acid</td>
<td>8.0</td>
</tr>
<tr>
<td>Butyric acid</td>
<td>12.0</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>5.0</td>
</tr>
</tbody>
</table>

The complex character of flavor explains the great difficulty in reproducing the various flavors occurring in nature. In many instances, the ingenuity of the chemists has approximated nature, but there are no synthetic products that can be detected by an individual with a very acute sense of taste. Nature, along with the metabolic demands of the food processor, has been a constant challenge to the food chemists, who have worked with the development of thousands of chemicals which are being constantly introduced into our food supply as flavorings. The search continues. Although several thousand chemicals are now available for food flavoring, the list continues to increase. The precise number of these chemicals in use is not known, but a number of secret formulas are protected by legislation. The United Kingdom (6) as well as several other countries, has regulations controlling the use of flavorings.

Recognizing that convenience foods are one of the great advantages of artificial flavors and colors, a recent report of the U.S. Department of Agriculture points up the widespread use of these chemicals. The report states that more than half of the foods purchased in the United States are ready to eat, which leaves only 3.8 per cent that are prepared by the consumer from basic ingredients, e.g., flour, shortening, eggs, milk, etc. This reflects the rapid increase in the sales of foods that have evolved over the past several generations which has emancipated women from many kitchen chores. Through the encouragement and promotion of the food processors, people have become more and more dependent upon convenience foods of every variety.

The literature on flavorings as well as other aspects of food additives is quite prolific. However, the reports on clinical patterns representing symptoms to foods chemicals are extremely limited and do not reflect the incidence of this problem that would be anticipated in view of the wide distribution of these chemicals in our food supply. An important factor contributing to the paucity of clinical reports is the lack of recognition that food additives are a relatively common cause of adverse clinical patterns.

Skin—Fruititis, dermatographia localized skin lesions urticaria, and angio-edema.

Adverse reactions induced by flavors

Gastro-intestinal—Macroglobulin, flatulence, and diarrhea caused by histamine or引起 gastritis.

Neurological symptoms—Headaches and behavioral disorders.

Skeletal system—Arthritis with edema.

It is important to note that practically every major body system is susceptible to the reaction by adverse reactions to food additives. Usually, only a single region is affected, but it is not uncommon for a mixture of these patterns to occur in one individual, most frequently, the skin and the gastrointestinal tract. It is not uncommon for the most dramatic and the behavioral disturbances to occur in children.

The exact incidence of this is not known, but figures vary from a conservative 5 per cent of all pupils in the South San Francisco, California school system to 25 per cent in Monroe County in upstate New York. The California Association for the Neurologically Handicapped estimates that in the past four years there are 5,000 children in the Los Angeles area who are not able to attend school, due to adverse reactions to food additives. The estimates for California are probably conservative, and in some areas the percentage of the school population who are not able to attend school is as high as 20 percent. These figures have no relation to socio-economic background. The great variations can only be explained by the broad spectrum of the disease, Minimal Brain Dysfunction (MBD) and Minimal Neurological Damage (MND), as these children are frequently labeled. (12)

Another factor that influences the statistics on incidence is the failure to recognize that hyperkinesis and learning difficulties are commonly interlinked and are actually different aspects of an identical problem. This is particularly true of dyslexia, a generic term applied to a whole category of reading and spelling disabilities.

Since reading disabilities among children are frequently an expression of the behavioral disturbance induced by hyperkinesis, it is interesting to refer to some figures on reading difficulties in the United States.

On March 22, 1972, in a presentation before the United States Senate by Senator Baker from the State of Minnesota, the following statistics were reported:

- It is estimated that some 18% million adults are functionally illiterate.
- Some 7 million primary and secondary school children are in severe need of special reading assistance.
- In large urban areas 40 to 50 per cent of its children are reading below grade level.
- That 90 per cent of the 700,000 students who drop out of school annually are classified as poor readers; and

The massive reading difficulties revealed in these statistics have been compiled by surveys of teachers and principals alike. An additional alarming statistic was recently released by the Dallas, Texas school system. At a commencement ceremony throughout the city of Dallas recently (June 1972), anywhere from 500 to 1,000 of Dallas' 9,000 graduating seniors walked across the stage to be handed diplomas they could not read.

Although statistics outside of the United States are not presently available, the overwhelming response from many countries to a recent presentation on H-LD would suggest that similar problems will occur in many countries throughout the world.

It is interesting to note that a graph projected the increase in the production of artificial flavors and soft drink beverages of various types parallels a graph for the increased incidence of H-LD among the school children of the U.S. for the past ten years.

The clinical pattern of the behavioral disturbance is chiefly that of hyperkinesis.

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which can range from simple restlessness to extreme hyperactivity, which, interfering with the child's attention span, is reflected in complete disruption both at home and at school. At home they are less than completely dutiful children whose willfulness and stubbornness, in the eyes of observers and parents, seem to have no limits, to which the response is rebelliousness in the child.

At school they are disruptive and in conflict with their schoolmates. Their impaired attention span leads to learning difficulties, in some cases even to failure. The children who are taxing the facilities for special classes for learning difficulties in all school systems. They are challenging the ingenuity of teachers and parents to the fullest extent over techniques to cope with this increasingly pressing problem. These patients are baffling our pediatricians, psychologists, neurologists, psychiatrists, and educators in the field of hyperactivity and learning difficulties. A large number of these children are being treated with either methylphenidate (Ritalin), amphetamines, and tranquillizers.

In our experience we have successfully treated some of these children with the sallycylate-free diet which eliminates the artificial flavors and colors.

To illustrate:

Case 1: A seven year old boy presented with a history of extreme hyperactivity of several years duration. When at home, he stomped around the walls and even charging on coming cars with his bicycle. At school his hyperactive behavior was remarkable, resulting in his inability to learn. Numerous pediatricians were consulted as well as psychologists, psychiatrists, and psychologists, including a complete medical and neurological survey at a teaching medical center. Nothing succeeded until the child was placed on a sallycylate-free diet. After a few weeks, the child's behavior improved, and he became well adjusted both at home and at school. Infractions of the dietary program led to a regression to all of the hyperkinetic behavioral patterns.

Case 2: A seven year old boy who because of hyperactivity and learning difficulties, was treated with 40 mg of Ritalin daily from August 2 to June 2, 1972. The drug was interrupted for about 6 weeks because of an intense drowsiness, but in August 1972 it was resumed at a dose of 20 mg daily.

Although attending a special learning class, his hyperactivity was not controlled, and his scholastic achievement was poor. Reports from his school indicated:

April 14, 1675—Excessive distractibility, extreme distractibility, inability to adjust to new situations, and irritability. The child talks constantly when he should be listening. The child was receiving 20 mg of Ritalin daily at this time.

April 3, 1975—The child was placed on a sallycylate-free diet, but Ritalin 10 mg b.i.d. was continued.

May 11, 1975—The mother reported a marked improvement in the child's behavior with a report from school that he had improved greatly in his reading. Ritalin was reduced to 6 mg b.i.d.

May 11, 1975—The mother reported that the hyperactivity was both at home and at school. Ritalin was discontinued.

June 6, 1973—Continued improvement at home. Psychological testing showed a great improvement at school. He has advanced in his studies so that he is now the best reader. He also has shown a marked decrease in the quality of his handwriting ability. The child is to be promoted to a higher grade.

Case 3: A seven year old boy presented with a history of hyperactivity dating to early infancy. Before the age of five, the child had large appetites, extremely hyperactive, and uncontrollable. He was unable to focus his attention on any project for more than 2 to 3 seconds. At 3 years and 6 months the child was placed on Ritalin following which he seemed less hyperactive. At 4 years of age, he exhibited a degree of "self control" and seemed better able to cope with routine demands.

At 5 years of age, he started school. He exhibited great learning difficulty involving the alphabet and numbers. His classroom behavior was that he had great difficulty socializing with his peers. At 7½ years Stelsaline (a tranquilizer) was added in order to control to a greater degree his daytime behavior, particularly at school, when Ritalin was not effective. Stelsaline also aided in improving the sleep pattern as well as the constant minor muscular movements of the child.

May 30 to July 2, 1973 the child was given allergy skin tests which proved negative.

July 2, 1973 the child was still receiving Ritalin 10 mg four times daily, or 40 mg per day, and Stelsaline 2 mg twice a day, or 4 mg daily.

A sallycylate-free diet was ordered for the child.

July 8, 1973, six days after starting the diet, the mother reported a "changed child"—the child seemed very close to his parents and peers. He is less distractable. The Ritalin was reduced to a single dose at 7 P.M. and continued for two days.

July 15, 1973 at 7:30 a.m. the child ate a bakery doughnut which was not permitted on his diet. By midday the child became hyperactive, argumentative, and had difficulty in controlling self.

July 16, 1973, a.m., the child returned to his "new normal" established by the diet package.

July 17, 1973 Stelsaline was discontinued. A single dose of Ritalin, 5 mg, at 7 a.m. was continued.

July 23, 1973, 21 days after starting the diet, all medication was stopped.

July 27, 1973, on an outside party at school: ate some candy at 10 a.m. At 12 noon the hyperactive behavior returned and persisted until June 19, 1973.

August 13, 1973 the child was doing extremely well.

The descriptive characteristics of the clinical pattern are as follows:

(1) Marked hyperactivity.

(2) Short attention span—jumps from one activity to another.

(3) Fidgetiness.

(4) Irritable and easily sensitive.

(5) Unpredictable and unmanageable.

(6) Quick tempered, explosive and panicky.

(7) Tolerance for failure and frustration is low.

(8) Exceptionally clumsy—poor coordination; eyes and hands do not seem to function together; has trouble buttoning.

(9) Has difficulty drawing and writing.

(10) Can't seem to keep from touching everything and everyone around.

(11) Normal or high IQ but fails at school.

In addition, it is important to note that the involvement affects boys almost exclusively and that rarely more than one child in a family is affected.

The cardinal signs observed following management with the sallycylate-free diet include:

(1) The rapid, dramatic change in behavior. Although the history of hyperkinetics with associated disturbances are usually of many years duration (3 to 4 years) and at times dating back to infancy, a favorable response is observed within days after instituting the diet.

(2) The child loses his hyperactivity, his motor excitement, and becomes well adjusted to his environment. The sleep pattern improves.

(3) Drugs which have been administered for several years can usually be discontinued after about 2 to 3 weeks of management and may take one month.

(4) Improved scholastic achievement is also dramatic. Within a single quarter at school, the child makes considerable movement in his reading and writing abilities as well as with numbers. This is consistent with the observation that the child has either a normal or a high IQ.

Since the incidence of an allergic diathesis among the human population is estimated to be at least 20 percent, it is not surprising that allergy is not an uncommon concomitant of H-LD. Although adverse behavioral responses in the absence of any apparent involvement of additives have been reported, allergy does not seem to be a frequent primary cause of hyperactivity. When allergy disease does accompany H-LD, in some cases it may be necessary to institute management for the allergy in order for the sallycylate-free diet to be effective.

The ability to "turn on" and "turn off" the pattern of hyperactivity, the discontinuance of the sedative and the accomplishment of improvement in scholastic achievement is strongly evidenced to support the relationship between H-LD and the ingestion of artificial flavors and colors. In most cases a review of the diet diary reveals a larger than usual ingestion of artificial flavorings and colors.

In view of these observations the question is raised, "Is it possible to attribute the improvement in the LD to the reduction of the chemical additives?"

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which is characterized by the replacement of a histidine residue by arginine at the α-position of the amino acid sequence of the beta chain of hemoglobin. (15) It is normally sensitive to oxidative denaturation but not to the point where this occurs spontaneously at an apparent rate. However, when such patients are given sulfonamides or other oxidant drugs, methemoglobinemia develops. The hemoglobin denatures and precipitates which results in malignant hemolytic anemia. Similar adverse effects have been observed with some other abnormal hemoglobin.

Another example is inherited deficiencies of the enzyme glucose-6-phosphate dehydrogenase (G-6-PD), a condition thought to affect some tens of millions of people. (16) Here again the pathology is essentially drug dependent, and hemolysis results from the accumulation of compounds, e.g. the anti-malarial primaquine, para-amino-salicylic acid, phenacetin, the sulfonamides and a number of other drugs. This is a condition of the broad family of oxidoreductases. It is interesting to note that the gene carrying the determining characteristics for this enzyme activity is located on the X-chromosome. This explains the greater frequency of the enzyme deficiency and drug sensitivity among males. It is also highly probable that in H-LD the X-chromosome may be involved, which could explain the overwhelming predominance of boys, as well as the occurrence in only one boy in a family.

A still further example of the contribution of genetic factors to the variability of drug metabolism is that observed with Isoniazid (INH) which is currently in common use for the treatment of tuberculosis. (17) Very early in the use of INH clinicians observed differences in the metabolism of the drug, whether measured by the decrease in serum level of INH or by the rate of urinary excretion in the form of acetyl INH. The problem was resolved following the demonstration that the general population is divided into two genetic groups, namely, "slow inactivators" and "rapid inactivators." INH inactivation is controlled by two autosomal alleles at a single genetic locus identified as R (rapid) and r (slow). Both homogygotes and heterozygotes are acetylators (AA and AR). Individuals who are R/R and R/r are rapid inactivators, while only the slow heterozygotes (rr) are slow inactivators. In other words, slow inactivation of INH is a recessive trait.

**TABLE VIII—GENETICS OF ISOINAZID (INH)**

<table>
<thead>
<tr>
<th>Phenotype</th>
<th>Homozygous (RR)</th>
<th>Heterozygous (Rr)</th>
<th>Homozygous (rr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 percent</td>
<td>Rapid inactivation</td>
<td>Intermediate inactivation</td>
<td>Slow inactivation</td>
</tr>
</tbody>
</table>

It is also interesting to note that slow inactivators (rr) are also more likely to experience skin reactions which are related to INH—the antiparasitic phenazone, a mono-amine oxidase inhibitor, and the antibacterial sulfonamides. This observation raises another important point relative to H-LD and the artificial colors or dyes. It is the possibility of cross reactivity among each group of chemicals, resulting in more than one color or more than one disease. We are at fault in the same individual. This is supported by our recognition that the colors are derived from four basic structurally related groups, while the artificial dyes and the sulfonamides also show a close structural relationship. Accordingly, the broad exclusion provided by the presence of a determinant in diet is necessary for successful management.

The Leach-Nyhan syndrome, which has been described in the literature, is a homozygote who may also serve as a guide in studying the possible genetic basis for H-LD as related to artificial colors and dyes. One of the most characteristic effects is a defect which involves a deficiency of the enzyme hypoxanthine guanine phosphoribosyltransferase (HGPRT). This enzyme activity is associated with the so-called Lesch-Nyhan syndrome with the exclusive implication of males. The importance of the Lesch-Nyhan syndrome as a guide in studying H-LD is twofold:

1. It should be possible to identify the H-LD-affected child with the known genetic abnormality which can be associated with a specific aberrant pattern of behavior, namely, compulsive aggression.

Although environmental influences have not been demonstrated for Lesch-Nyhan disease, nevertheless, it is conceivable that various other patterns of X-chromosomal or possibly polygenic alterations may be responsible for environmentally induced behavior patterns, e.g. the artificial colors and flavors in H-LD.

In addition to metabolic disturbances and enzymatic variations, anomalies of the receptor alteration may also cause either increased or decreased sensitivity as is observed in coumarin tolerance and vitamin D deficiency.

It is also possible that the involvement of children with either normal or high IQs may be on a genetic basis. Educators and child psychologists generally recognize that in the early years and throughout the preschool age, boys exceed girls in learning achievement. By the beginning of school, however, there are no longer consistent differences. It is also at school age that the pattern of boys exceeds girls in most children. This could also be an expression of the pharmacological activity of the artificial colors and flavors which are exerting their depressive action upon normal physiological functions.

On the basis of the observations in pharmacogenetics, it is conceivable that H-LD is an expression of the pharmacological activity of artificial colors and flavors in individuals with genetic variability. It is possible that the adverse responses to these chemicals are the result of an expression which prevents the normal expression of these children. A repressor effect could explain not only the rapid, dramatic improvement in the clinical pattern which follows elimination of the chemicals, but also the sudden appearance of symptoms within hours, following ingestion of the additives.

In addition, the rapid improvement observed both in the behavioral pattern and scholastic achievement would indicate that food chemicals are a functional derangement due to the pharmacological activity rather than persistent organic changes. On the other hand, this position cannot be assumed for those children who fail to respond favorably. Is it possible that children who fail to respond experience irreversible damage induced by the additives? This raises another aspect of the problem for consideration. What is the role of food additives during pregnancy?

Investigators in the field of fetal development and pharmacology suspect that drugs during pregnancy exert a subtle effect upon the child which may be manifested later in life as behavioral disturbances. Food additives like drugs, are low molecular weight chemicals which can also have the capacity to cross the placental barrier and may have similar adverse effects upon the child following ingestion during pregnancy.

The control of hyperkinetics with subsequent improvement in scholastic achievement has been noted in association with the salt-containing-free diet. The precise identification of the specific factors among such food additives has not been determined. The nature of the pharmacological behavior of these chemicals is not understood. The use of H-LD among school children is not known but is generally recognized as being high and consistently rising. Nevertheless, with the recognition of this basic contribution of the critical state of the problem and its extremely wide distribution among the school children, it is clear that a broad based program for the management of H-LD with the salt-free, sugar-free diet is desirable. Treatment and the risks are nil. The program involves no danger to the health and behavior of the child, nor are there costs involved.

In order to implement the effectiveness of the program, it is essential to have widespread public awareness of the universal distribution of additives and the potential of these chemicals for causing adverse reactions. A campaign for such information and package labels should alert the public regarding the imminence of the problem.

The recognition that Food Additives are linked to H-LD should open many areas for investigation, particularly in the fields of pharmacology and toxicology. The availability of specific food additives as research tools could be invaluable in determining adverse reactions. Such observations could explain the prevention of H-LD for boys and also the selective involvement of children, a child in a family. The food chemicals could also be studied by the correlation of the physiological responses associated with other emotional and behavioral disturbances.

Confirmation of the thesis as concerns H-LD would justify an extension of the studies to other areas of emotional and behavioral disturbances, not only in children but also in adults. And further, the same concept could be applied to the possible role of foods in the behavior of ethnic groups.

Such an extension of the investigations would necessitate increased knowledge concerning all the accessory natural compounds occurring in various foodstuffs. Presently, such information is lacking. It is not possible that many emotional and behavioral disturbances of man may be due to the pharmacological behavior of accessory food chemicals which are still unknown, even in small quantities, while others may occur only in trace amounts.

The information can be of extreme importance in future planning of food supplies for a growing population which will become more and more dependent on food products, many of which will be flavored and colored with artificial additives. In addition, necessary studies are extended to include all food chemicals, both natural and artificial, a new dimension could be available for evaluating the Food/Man equation.


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U.S. SENATE,
COMMITTEE ON COMMERCE,
The Honorable Harold Cannon, Chairman, Subcommittee on Health, Sen-
ate Labor and Public Welfare Commit-
tee, Washington, D.C.

DEAR MR. CHAIRMAN: I urge that one of the earliest witnesses during the upcoming hearings on drug allergies in the United States of America, Department of the Interior, Department of the Interior, Assembly and Permanent Mediation Committee.

Dr. Feingold has found that artificial food substances may cause a large number of hyperactivity, a problem major problem in the country. A conserva-
tive estimate is that moderate and severe dis-
orders are found in about 3% of elementary school children; however, this varies from school to school. For example, it is higher in about 25% of the county. The Minnesota school children in San Francisco is a conservative 5% and it is as high as 50% in Monroe County in upstate New York. The United States has a problem of neurological handicapped children that in the past ten to twelve years of hyperactivity among California school children. Some studies of children have risen from 2% to an average of 20 to 25%, and in some cases 40% of the entire school population.

A significant number of the children with hyperactivity have special learning or reading problems. Feingold's work indicates a link between hyperactivity in children and artificial food coloring and flavors.

For example, in one group of twenty-five hyperactive children, Dr. Feingold was able to eliminate or dramatically reduce the dis-
orders for at least fifteen children by putting them on a diet free of artificial food colors and flavors. Even more dramatic was the ability to trigger the return of hyperactivity in the remaining five children within 24 hours, by putting artificial substances back into the child's diet.

Since early May I have been communicating with Dr. Feingold and with the Food and Drug Administration and the National Institute of Mental Health, in an effort to call attention to this and generate additional support for his efforts. At the present time many hyperactive children are being awakened from the drugged state by being put on various diets. If hyperactive children can be controlled simply by changing children's diets, then we certainly should find it preferable to move in this direction. Furthermore, if there is a link between those artificial food additives and hyperactivity, then the entire use of artificial colors, flavors and other additives should be examined with regard to their potentially dangerous effects on humans.

Therefore, I strongly urge that the Com-
mittee give Dr. Feingold an opportunity to present his findings. I appreciate your co-
noperation.

With best wishes, I am

Sincerely yours,

J. Glenn Easley, Jr.

PARAGUAYAN INDIAN HUNT

Mr. ABOUZEK, Mr. President, in an article in the yaşam of Temple University in a recent issue of Nation, we see another pitiful example of the barbarism and inhumanity which exists in countries whose governments are our friends.

The Paraguayan regime of Gen. Al-
drew Stroessner is bent on a systematic liquidation of the Aché Indian nation. Achés are being hunted and indiscriminately killed regardless of age, sex, or position. Those willing to accept Slavery may be kept alive as work hands without medical attention. The use of their lan-
guage is discouraged and traditional mu-
sio is prohibited.

The Paraguayan National Police Force has selected several hundred political prison-
ers and one woman, in this case actual turning crime as merely their standard operating procedure. Mr. Arens reports that even ranking members of the Paraguayan government, including some of their own ranking members, have to endured torture sessions as a matter of course.

Mr. President, this year we are giving the Stroessner regime over $11.5 million in military and economic aid. Furthermore, we have long been involved in the training of Paraguayan military, para-

military and police forces. This year alone we will give Stroessner and his repressive regime over $3.5 million in military assistance, training and advice. Nothing could be more of an incentive to such an inhum-
ane government than a continuing flow of aid.

Perhaps one reason why our aid con-
tinues to flow abundantly to this govern-
ment is the close relationship which exists between General Stroessner and our U.S. Ambassador to Paraguay. Prof-
essor Arens reports that General Stroessner once told American reporters that he regarded the U.S. Ambassador as a member of his Cabinet.

Mr. President, I am shocked and ap-
palled at the findings of Professor Arens. For the United States to support a gov-
ernment bent on the genocide of its peo-
ple certainly makes the United States an "accessory to the crime." I ask unanimous consent that this arti-

Sincerely yours,

J. Glenn Easley, Jr.