

hair sprays, ink on the skin, "scratch and sniff notebooks," colored chalk, air freshners, scented candles, colored and flavored medications, colored toothpaste, etc.

**CASE STUDY #21. TREATMENT OF HYPERACTIVITY  
IN A CHILD WITH ALLERGIES TO FOODS\***

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There is increasing evidence that hyperactivity in children is a final common result from a variety of etiological factors. Among these are neurological complications following prenatal or perinatal trauma (Minde et al., 1968); maternal smoking during pregnancy (Dawson et al., 1976); exposure to metals such as lead (David, 1974); fluorescent lights (Arehart-Teichel, 1974); stress and genetic transmission (Waldrop and Halverson, 1971); and artificial food additives such as colors, flavors, and preservatives (Feingold, 1975). In addition, a variety of neuropsychological manifestations in children are thought to be caused by adverse allergic reactions to inhalants and foods. Symptoms of irritability, fatigue, hyperactivity, or severe mental depression diminish or disappear following elimination of certain foods from the child's diet (Clarke, 1950).

Follow-up studies have shown that hyperactive children are at high risk for school drop-out, psychiatric problems, abuse of drugs, alcoholism, and criminality (Barcai, 1974; Blouin et al., in press; Goodwin et al., 1975). These discouraging results are mainly due to the fact that hyperactive children with heterogenous etiologies have been grouped together and often administered only one mode of treatment consisting of stimulant drugs. Perhaps the long term results would be more encouraging if there were rationale for treatment, and treatment choice were more closely matched with a given etiology.

In the Neuropsychology Laboratory at the Royal Ottawa Hospital, a large long-term investigation of hyperactivity is underway. The purpose of

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such a study is to develop a rationale for the treatment of hyperactivity. In this study, hyperactive children are intensively investigated on a variety of neuropsychological, personality, neurological, psychophysiological, biochemical, and immunological parameters in an attempt to carefully subgroup the children's conditions. A variety of treatments is then systematically tried on each subgroup, including stimulant drug, behavioral therapy, and elimination diet. Children in each subgroup are then followed over a three-year period, at the end of which an attempt is being made to match the most effective treatment with the particular subgroup of hyperactive children.

We are presently investigating the possible association of food to hyperactivity in specific subgroups of hyperactive children in ways other than the adverse reactions to artificial food additives theory first described by Feingold (1975) and carefully studied by Connors et al. (1976). For example, it is found that approximately two-thirds of the hyperactive children tested have elevated levels of specific reaginic (IgE) antibody to one or more of 42 different food extracts tested by the radioallergosorbent test RAST (Tryphonas & Trites, Note 1). Phadebas RAST Kits (Pharmacia Laboratories; Montreal, Quebec) are used to determine serum IgE antibodies directed against specific food allergens (Chau et al., 1976; Haddad and Korotzer, 1972). Radioactivity in the test and control tubes is measured using a Beckman's Y-counter. RAST scores (0-4) are based on a serially diluted reference serum supplied by Pharmacia. A score of one or greater is considered to be positive.

The validity of the RAST results is further investigated in a doubleblind cross-over study. During this study, half of the children are instructed to follow a treatment diet which eliminates all foods that evidence a positive RAST result for a period of three weeks. The treatment diet is followed by a placebo diet for the same duration. The placebo diet is designed to exclude foods equal in number and nutritionally equivalent to those included in the treatment diet, but having negative RAST results. For the other half of the children, the order of the diets is reversed. The following case report focuses on a child belonging to this specific subgroup of hyperactive children.

### Daniel

#### Current Problem and Background Information

Daniel was a six-year, seven-month-old male, enrolled in a transition class, between kindergarten and grade one. The product of a full-term pregnancy, he weighed 7 lbs. 13 oz. at birth. There were no reported com-

plications. His milestones were normal and he suffered nothing but the usual childhood illnesses. However, at the age of approximately one year, Daniel's parents became concerned about his behavior, particularly his increasing activity, aggressiveness toward his younger brother, and severe temper tantrums which occurred several times a day. These problems gradually increased to the extent that he could no longer be left unsupervised.

At the age of five years and 10 months, Daniel received a neuropsychological examination, which consisted of various language, perceptual, IQ, and academic achievement tests, along with a detailed standardized motor and sensory examination (Trites, 1978). He scored a Verbal IQ of 104, Performance IQ of 103, and a Full Scale IQ of 104 on the Wechsler Intelligence Scale for Children. Academic achievement testing indicated that reading, spelling, and arithmetic skills were at the beginning grade-one level. Motor and sensory functions were normal. Teachers' ratings on the Conners Rating Scale (Conners, 1969) substantiated the parents' ratings and clinical judgment that this was a highly hyperactive youngster who was physically well developed, well coordinated, and possessed at least average learning potential. He was then placed on a trial of Methylphenidate (Ritalin), 15 mg t.i.d. The parents and teacher reported that they noticed no beneficial effects of the drug; in fact, he appeared to be more unmanageable while on it.

#### Intervention

As part of the extensive baseline evaluations, Daniel was examined for the presence of allergies to foods. His parents were carefully instructed and a complete three-week food diary was obtained. From the diary, a list of 42 foods most commonly consumed by the child was obtained and the RAST test was performed. Clinically significant levels of specific reaginic antibody were detected to oats and rye, with a RAST score of one for each of the foods.

In addition, information pertaining to allergies in the child and his family (siblings, parents, and grandparents) was obtained by directly interviewing the patient and his parents via an itemizing allergy questionnaire. Daniel's history did not reveal the presence of any allergies. However, a review of the family history of allergy disclosed that his maternal grandmother suffered from severe asthma since she was five years old. At the age of 22 years, asthma became gradually milder, giving way to hayfever. The latter persists to date, at the age of 75. Daniel's mother also developed severe hayfever

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DAILY RATING (20)

FIG. 1.

at the age of 15. This condition persists to date, but in a mild form. Furthermore, Daniel's mother and grandmother suffered from a mild sporadic eczema.

Daniel was rated by his parents and teacher (Conners parent and teacher Questionnaires) prior to being placed on the three-week treatment elimination diet which excluded all foods containing oats and rye diet. He was also reassessed before being placed on the three-week placebo diet, during which an equal number of foods to which he did not show an allergic reaction were removed systematically from his diet, in order to measure placebo effects. In addition, the child was rated daily during the treatment and

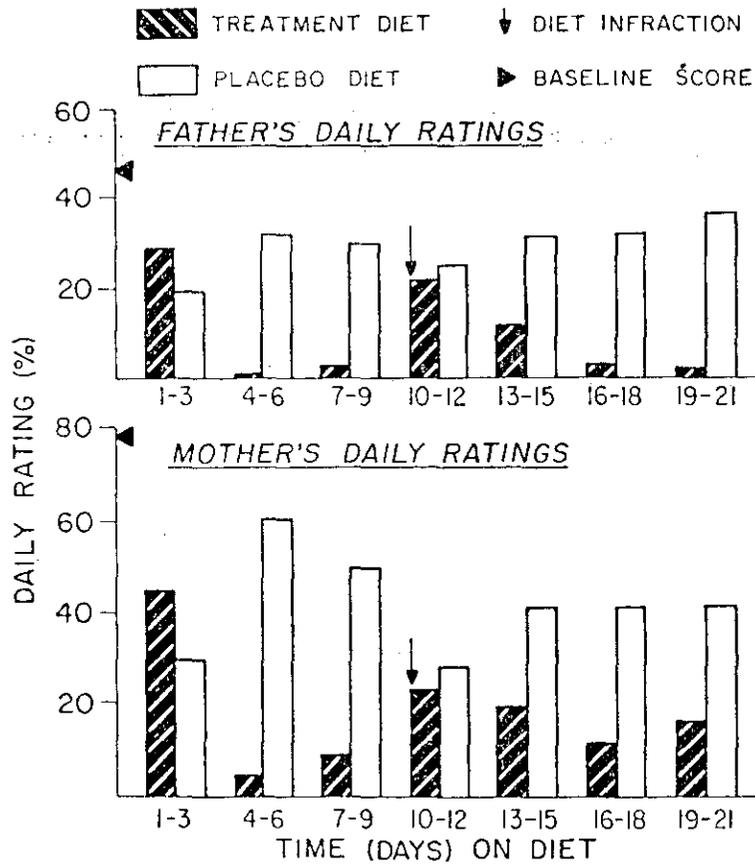


FIG. 1. Parent Daily Ratings (%) of Hyperactivity (Conners Parent Questionnaire) for Treatment and Placebo Diets.

placebo diets independently by his mother and father, using the short form of the Conners Parent Rating Scale (Conners, 1970). Furthermore, the parents were instructed to review with Daniel all of the foods he had eaten and list any infractions of the diet daily.

Considering the mother's ratings first, it can be seen from Figure 1 that the baseline rating of hyperactivity which she assigned to Daniel was almost 80 percent on the Conners Scale. Under both elimination and placebo diet phases, the ratings tended to be diminished as compared to baseline. However, there was clear evidence of a substantial beneficial effect when foods to which Daniel was considered to be allergic, (the cross-hatched bars) were eliminated from his diet. During day 10, this youngster inadvertently went off his diet and ratings of hyperactivity increased, followed by a gradual decrease once again of levels of hyperactivity on succeeding days.

Baseline levels of the father's independent ratings were lower than the mother's analogous ratings. It is, in our experience, typical for fathers to rate their children as somewhat less hyperactive than mothers. However, from the father's ratings there was also significant diet treatment effect. In fact, in the three-day periods 4 to 6 and 7 to 9, Daniel's behavior had dramatically improved, as was the case with the mother's ratings. The father also reported an increase in hyperactivity in the three-day period (days 10 to 12) when the child inadvertently went off the diet. This was followed once again by an improvement in behavior in the subsequent three-day periods.

#### Conclusions

The study of Daniel presents support for a diet management position with selected children. We have found that approximately 20 percent of hyperactive children show a substantial improvement on an elimination diet, controlling for specific foods to which the child is allergic. We are currently monitoring the progress of hyperactive children with food allergies maintained on an elimination diet, since this appears to be a promising treatment approach for some of these children.

#### Reference Note

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