The Incidence of Food Allergy in Down Syndrome Subjects as Determined by IgG and IgE Rast

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Down's Syndrome is associated with varying degrees of immunodeficiency. This has been the explanation for the increased incidence of the following within the DS population:[1-6]

Leukemia
Respiratory infections
Gastrointestinal infections
Autoimmune disorders
Middle ear fluid accumulation
Thyroid dysfunction

Autoimmune disease There are also longstanding reports of relationships between respiratory infections and middle ear fluid accumulation or infection and food allergy.[7-13] Although not a commonly recommended or pursued treatment modality, food allergy elimination has been a reportedly successful regimen for several decades.[13,,19] This preliminary study is an attempt to quantify the incidence of specific food allergies within a group of DS subjects.

In order to simplify the testing procedures, the Radioallergosorbent Testing (RAST) procedure was chosen. This selection also allowed for concurrent testing for both the IgE and the IgG antibody. Elevated IgG antibody counts have also been implicated in food allergy.[20-22] In addition, the RAST allowed me to test for circulating immune complexes (CIC) in both IgE and IgG categories. The CIC are antigen-bound antibodies and have been implicated in systemic dysfunction, and may provide yet another parameter whereby an abnormal immune response can be observed.[2226]

Methods

The study utilized subjects ranging in ages 1 year to 25 years old. Parents indicating an interest in the RAST results volunteered their child's participation in exchange for the data. Because the purpose of this investigation was to provide preliminary data justifying further efforts along similar lines, no attempt was made to provide age-matched controls without DS.

Subjects presented at Deaconess Medical Center for blood drawing and serum preparation for shipping to an out-of-state laboratory with RAST capabilities. A single hospital lab was selected to eliminate possible variables introduced by multiple lab involvement in this step. Serum was shipped out for analysis by 2nd Day Air or UPS.

The foods or food components tested for IgE and IgG antibodies were:

Milk	Wheat
Lactoglobulin	Rye
Egg White	Gluten
Beef	Gliadin
Peanut	Corn
Soy	Millet

Chocolate The foods or food components tested for IgE CIC and IgG CIC were:

Milk	Wheat
Lactoglobulin	Rye
Egg White	Gluten
Soybean	Corn

Standard immunoassay analysis was utilized to count levels of specific food antibodies. The levels of reactivity range from a zero or "nonreactive" category to within the "1+to 5+" levels of reactivity. The 1+ category is indicative of, and labeled as, an "equivocal" allergic reaction, 2+ and 3+ as a "moderate" allergic reaction, and 4+ and 5+ as a "severe" allergic reaction. These levels are computer derived by averaging a statistically significant number of the subjects' nonreactive foods, and thereby factoring them out of the reactive food antibody counts. The same levels of reactivity are utilized for the CIC as well.

Results

All of the subjects exhibited elevated IgE and IgG antibody counts to one or more of the foods tested. The ten subjects had a total of 49 elevated IgE antibody counts: six subjects had elevated IgE CIC for one or more of eight foods tested. The subjects had a total of 55 elevated IgG antibody counts; nine subjects

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had elevated IgG CIC for 1 or more of 8 foods. There appeared to be no general correlation between the incidences of elevated IgE and IgG antibody counts to specific foods.

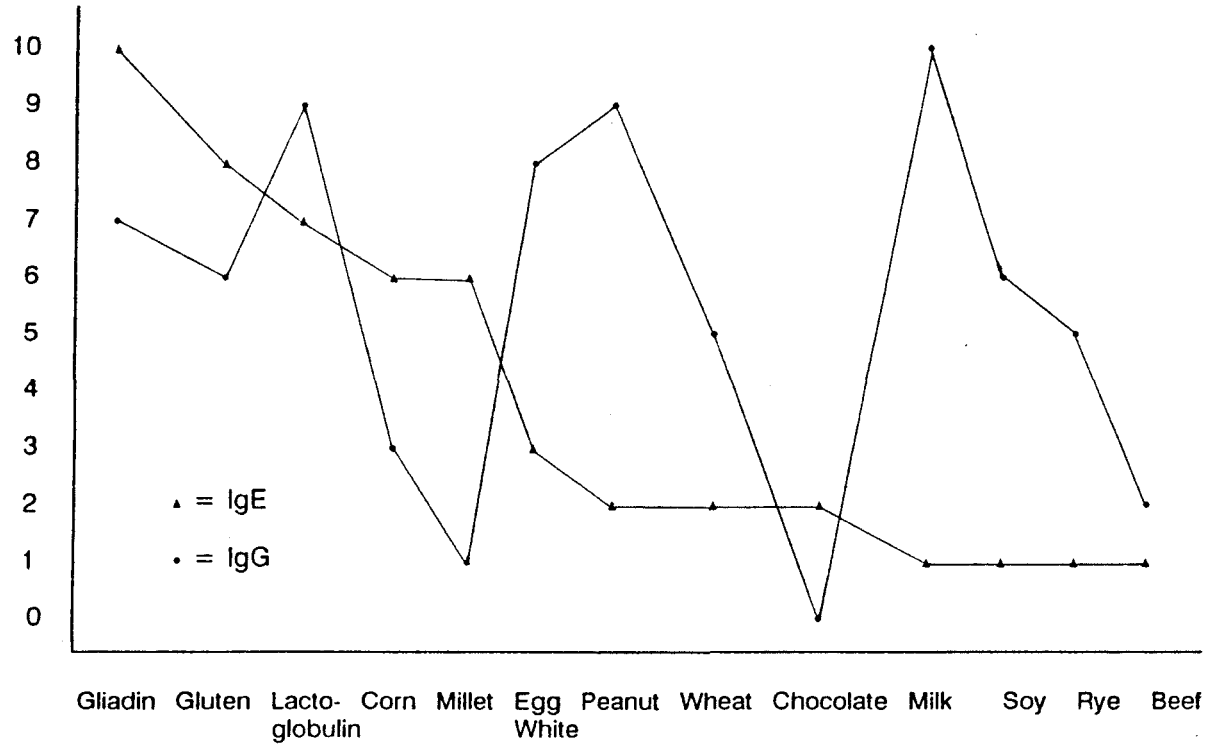
Table 1 demonstrates the incidence of elevated IgE and IgG counts to all of the foods. Specific food or food components, such as lactoglobulin, gluten or gliadin, elicited a relatively high incidence of elevated counts of both IgE and IgG antibodies. Conversely, beef elicited a low incidence of elevated counts of both antibodies. Otherwise, no obvious correlation was observed.

Tables 2 and 3 demonstrate the relative reactivity levels of the elevated antibodies and CIC to specific food for each subject. Table 2 reveals that, without exception, all of the IgE reactivity levels to every food tested were 1+ or lower. This would imply low levels of reactivity as mediated by IgE antibodies and defined as an "equivocal" allergic response. Six of the ten subjects also were found to have CIC to one or more foods. In spite of only 1 +IgE levels, four of the subjects revealed CIC levels of 3+, 4+, or 5+. Also, three subjects revealed CIC level of 1+ without 1+ IgE levels.

Table 3 demonstrates significantly higher IgG reactivity levels overall with a high frequency of extremely high antibody counts for specific foods; notably, cow's milk, peanut and egg white. Nine of the ten subjects displayed 5+ to cow's milk; the tenth subject had a 2+ level. Seven subjects displayed 5+ to peanut; one was 4+, another was 1+, and the remaining subjects showed nonreactive antibody levels. Six subjects displayed 5+ reactivity to egg white; one was 2+, another was 1+, and the remaining two subjects were non-reactive.

Of notable interest is the level of reactivity to wheat, or its components, gluten and gliadin. Three of the subjects had 4+ or 5+ levels of reactivity to wheat, and one subject had a 2+ with a 4+ IgG CIC. In response to gluten, another two subjects had 2+ and 3+ reactivity levels, IgG and IgG CIC respectively. Three more subjects had 1+ IgG and/or IgG CIC reactivity levels, bringing up to nine out often subjects with a possible reaction. Four sub-

Table 1
Comparison of the Frequency of IgE and IgG Reactivity



jects had 2+ or 5+ reactivity levels to gliadin and another was 1+. These results implicate potential digestion/absorption problems with wheat and/or gluten-containing grains, especially in light of other reports of celiac disease in Down's Syndrome subjects.[2730]

Other foods testing at *2*+, 3+, 4+, or 5+were as follows, in decreasing order of intensity/ frequency:

Soy
Lactoglobulin
Beef
Rye

The computer determined reactivity levels

Table 2
IgE Reactivity Levels

Gliadin	1+	1+	1+	1+	1+	1+	1+	1+	1+	
Gluten	1+ / 3+	1+			1+	1+	1+	1+ / 5+	1+ / 1+	1+
Lactoglobulin	1+	1+	1+		1+		1+	1+	1+	1+ / 4+
Corn	1+	1+				1+	1+ / 3+	1+	1+	1+
Millet	1+				1+	1+	1+	1+	1+	
Egg White						1+			1+	1+
Wheat				1+				1+		
Peanut									1+	1+
Chocolate						1+		1+		
Cow's Milk										1+
Beef									1+	
Soy	1+									1+ / 1+
Rye										1+
	MO	DS	AAH	AH	DS	TM	AS	CL	LT	AG

Numerator = Level of Elevated IgE (by food) Denominator = Level of CIC

of 5+ do not show that, while the 5+ range would begin at antibody counts approximately twice the non-reactive level (below 1+), 5+ levels often included antibody counts of fivefold or even tenfold the non-reactive levels.

Nine of the ten subjects had elevated IgG CIC to one or more of six foods. Each of the nine subjects had elevated CIC to two or three separate foods. Approximately one-half of the CIC reactivity levels were at or below their respective IgG reactivity levels. The other half of the elevated CIC levels were either greater than their respective IgG levels, or present with non-reactive levels of IgG.

Table 3
IgG Reactivity Levels

Gliadin		5+		2+			1+	5+	5+	
Gluten	1+/1+	5+	1+	2+	1+		1+	5+/1+	5+/1+	3+
Lactoglobulin	1+/5+	4+/1+		2+	1+	4+/5+	2+/1+	1+/5+	1+/5+	5+
Corn		3+		1+			2+			
Millet							1+			
Egg White	2+	5+	5+/1+	1+		5+/1+	5+	5+	5+	
Wheat		5+					2+/4+	4+	5+	
Peanut		5+	5+	5+	5+	1+	5+	4+	5+	5+
Chocolate										
Cow's Milk	5+	5+	5+	5+	2+	5+	5+	5+	5+	5+
Beef							5+			5+
Soy		5+		2+	1+		1+		5+	4+
Rye		4+/1+		1+/1+		1+		1+	2+	
	MO	DS	AAH	AH	DS	TM	AS	CL	LT	AG

Numerator = Level of Elevated IgG (by food) Denominator = Level of CIC

Eight subjects had IgG CIC to lactoglobulin, five to gluten, and three to corn. Two or fewer subjects had IgG CIC to the following foods:

Egg white
Rye
Wheat

The limited RAST results tend to confirm reports of elevated IgG immunoglobulins[31,32] and lowered IgE immunoglobulins.[2,33] Larger numbers of subjects would be required to confirm these relationships.

Discussion

The presence of food allergies, as indicated by RAST, should not be unexpected considering other previously measured aspects of immune dysfunction with the DS population. Unfortunately, the issues of food allergy and its management, often generate significant diversity of opinion within the health profession. Too often the DS children and their families have been set aside as the controversy rages.

As a parent of a DS child and acquainted with dozens of such families, I became aware of the value of food allergy elimination for improved health. Reports from parents following elimination diets for their DS children have confirmed such improvements almost without exception. DS children subjected to elimination of above-tested allergies reported significant reduction in the incidence of otitis media, middle ear fluid accumulation, and respiratory illnesses. These anecdotal reports, compounding the RAST data, suggest the need for further testing of a larger DS population with controls and subsequent dietary manipulation to confirm these results.

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