

# Food-Borne Illness Lows Despite Salmonella Cases

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The incidence of several major food-borne infections declined markedly between 1996 and 2004, preliminary data from the Centers for Disease Control and Prevention suggest.

For the first time in 2004, the national incidence of Shiga-toxin-producing *Escherichia coli* (STEC) O157 infections fell below the Healthy People 2010 goal of 1

case per 100,000 population. In addition, rates of *Campylobacter* infection are approaching the target of less than 12.3 cases per 100,000, while the 2004 rate of *Listeria*, 2.7 per 1 million population, is nearly down to the goal of 2.5 cases per million, to be reached by the end of 2005.

But although most of the news from the CDC's 10-site Food-Borne Diseases Active Surveillance Network (FoodNet) was good, there were increases in the incidence of both *Vibrio* and two *Salmonella*

serotypes from baseline in 1996-1998 to 2004, according to the CDC (MMWR 2005;54:352-6).

In 2004, a total of 15,806 laboratory-confirmed cases of infections were identified in the FoodNet surveillance area, which included 44.1 million individuals, or 15.2% of the U.S. population. The three most frequent were *Salmonella* (6,464 cases), *Campylobacter* (5,665), and *Shigella* (2,231), followed by *Cryptosporidium* (613), STEC O157 (401), *Yersinia* (173), *Vibrio*

(124), *Listeria* (120), and *Cyclospora* (15).

FoodNet cases were part of 239 nationally reported food-borne disease outbreaks, of which 58% were associated with restaurants. Of the 152 outbreaks in which an etiology was reported, the most common were norovirus (57%) and *Salmonella* (18%).

In 2003, FoodNet collected data on 52 cases of hemolytic-uremic syndrome in children less than 15 years of age (rate 0.6 per 100,000). Of those, 36 (69%) were among those younger than 5 years, the CDC said.

In comparing the preliminary 2004 numbers with those from 1996 to 1998, the CDC adjusted for the difference in FoodNet's population, which was just 14.2 million during the earlier time period. The estimated incidence of infections with *Campylobacter* decreased by 31%, *Cryptosporidium* by 40%, STEC O157 by 42%, *Listeria* by 40%, *Yersinia* by 45%, and overall *Salmonella* infections by 8%. The estimated incidence of *Shigella* infections in 2004 wasn't significantly different from the baseline period, while overall *Vibrio* infections increased by 47%, to 2.8 per 100,000 population in 2004, the CDC reported.

## The substantial increase in *S. javiana*, a 41% increase, was due in part to a multistate outbreak in 2004 that was associated with Roma tomatoes.

Although the incidence of *Salmonella* decreased overall, only one of the five most common serotypes, *S. typhimurium*, actually dropped significantly (by 41%). Two of the others—*S. enteritidis* and *S. heidelberg*—didn't change, while both *S. newport* and *S. javiana* rose by 41% and 167%, respectively. The substantial increase in *S. javiana* was due in part to a multistate outbreak in 2004 that was associated with Roma tomatoes, they noted.

The substantial decline in STEC O157, first seen in 2003, coincides with several important food safety initiatives and educational efforts, and is consistent with reports from the U.S. Department of Agriculture of declines in contamination of ground beef following industry responses to governmental food safety initiatives.

The drop in *Campylobacter*, on the other hand, likely reflects efforts to reduce contamination of poultry and to educate consumers about safe food handling, the CDC said.

Rises in some salmonella strains reflect a lack of understanding about the epidemiology of the organism and the methods by which it contaminates produce. Multidrug resistance is also a problem with *Salmonella*, particularly the *newport* strain.

The reasons for the increase in *Vibrio*, which is typically associated with seafood, are not clear. The Food and Drug Administration is currently conducting an assessment.

### Diphtheria and Tetanus Toxoids and Acellular Pertussis Vaccine Adsorbed DAPTACEL®

BRIEF SUMMARY: Please consult package insert for full prescribing information.

**INDICATIONS AND USAGE:** DAPTACEL® is indicated for active immunization against diphtheria, tetanus and pertussis in infants and children 6 weeks through 6 years of age (prior to seventh birthday). Children who have had well-documented pertussis (culture positive for *B. pertussis* or epidemiologic linkage to a culture positive case) should complete the vaccination series with DT, some experts recommend including acellular pertussis vaccine as well. Although well-documented pertussis disease is likely to confer immunity, the duration of protection is unknown.<sup>1</sup>

**CONTRAINDICATIONS:** This vaccine is contraindicated in children and adults seven years of age and older. Hypersensitivity to any component of the vaccine is a contraindication to further administration of any pertussis-containing vaccine.<sup>2</sup>

**• An immediate anaphylactic reaction.** Because of uncertainty as to which component of the vaccine may be responsible, no further vaccination with diphtheria, tetanus or pertussis components should be carried out. Alternatively, such individuals may be referred to an allergist for evaluation if further immunizations are to be considered.

**• Encephalopathy not attributable to another identifiable cause (e.g., an acute, severe central nervous system disorder occurring within 7 days after vaccination and consisting of major alterations in consciousness, unresponsiveness or generalized or focal seizures that persist more than a few hours, without recovery within 24 hours).** In such cases, DT vaccine should be administered for the remaining doses in the vaccination schedule.

The decision to administer or delay vaccination because of a current or recent febrile illness depends on the severity of symptoms and on the etiology of the disease. According to the ACP, all vaccines can be administered to persons with mild illness such as diarrhea, mild upper-respiratory infection with or without low-grade fever, or other low-grade febrile illness.<sup>1,3</sup> However, children with moderate or serious illness should not be immunized until recovered.<sup>4</sup>

Elective immunization procedures should be deferred during an outbreak of poliomyelitis because of the risk of provoking paralysis.<sup>5,6,7</sup>

**WARNINGS:** The stopper to the vial of this product contains dry natural latex rubber that may cause allergic reactions.

If any of the following events occur within the specified period after administration of a whole-cell pertussis DTP or DTap vaccine, providers and parents should evaluate the risks and benefits of subsequent doses of whole-cell pertussis DTP or DTap vaccine.

**• Temperature of >40.5°C (105°F) within 48 hours, not attributable to another identifiable cause.**  
**• Collapse or shock-like state (hypotonic-hyporesponsive episode) within 48 hours.**  
**• Persistent crying lasting ≥3 hours within 48 hours.**  
**• Convulsions with or without fever within 3 days.**

When a decision is made to withhold pertussis vaccine, immunization with DT vaccine should be continued.<sup>4</sup>

Because of the risk of hemorrhage, DAPTACEL® should not be given to children with any coagulation disorder, including thrombocytopenia, which would contraindicate intramuscular injection unless the potential benefit clearly outweighs the risk of administration.

Studies suggest that, when given whole-cell pertussis DTP vaccine, infants and children with a history of convulsions in first-degree family members have a 2.4-fold increased risk for neurologic events.<sup>8</sup> However, ACP has concluded that a history of convulsions or other central nervous system disorders in parents or siblings is not a contraindication to pertussis vaccination and that children with such family histories should receive DTP vaccines according to the recommended schedule.<sup>1,9</sup>

For infants or children at higher risk for seizures than the general population, an appropriate antiepileptic may be administered (in the dosage recommended in its prescribing information) at the time of vaccination with a vaccine containing an acellular pertussis component (including DAPTACEL®) and the following 24 hours, to reduce the possibility of post-vaccination fever.<sup>2,9</sup>

Whether to administer DAPTACEL® to children with proven or suspected underlying neurologic disorders must be decided on an individual basis. An important consideration includes the current local incidence of pertussis. The ACP has issued guidelines for such children.<sup>10</sup>

**PRECAUTIONS: General:** Care is to be taken by the health-care provider for the safe and effective use of this vaccine.

Epinephrine Hydrochloride Solution (1:1,000), other appropriate agents and equipment must be available for immediate use in case an anaphylactic or acute hypersensitivity reaction occurs. Health-care providers must be familiar with current recommendations for the initial management of anaphylaxis in non-hospital settings, including proper airway management.<sup>11</sup>

Before an injection of any vaccine, all known precautions should be taken to prevent adverse reactions. The expected immune response to DAPTACEL® may not be obtained in immunosuppressed persons.<sup>4</sup> Pertussis-containing vaccines are not contraindicated in persons with HIV infection.<sup>12</sup>

IT IS EXTREMELY IMPORTANT WHEN A CHILD RETURNS FOR THE NEXT DOSE IN THE SERIES THAT THE PARENT OR GUARDIAN SHOULD BE QUESTIONED CONCERNING ANY SYMPTOMS AND/OR SIGNS OF AN ADVERSE REACTION AFTER THE PREVIOUS DOSE OF VACCINE. (See CONTRAINDICATIONS AND ADVERSE REACTIONS.)

**Drug Interactions:** As with other intramuscular (I.M.) injections, use with caution in patients on anticoagulant therapy.

Immunosuppressive therapies, including irradiation, antimetabolites, alkylating agents, cytotoxic drugs and corticosteroids (used in greater than physiologic doses), may reduce the immune response to vaccines. Although no specific studies with pertussis vaccine are available, if immunosuppressive therapy is to be soon discontinued, it seems reasonable to defer immunization until the patient has been off therapy for one month; otherwise, the patient should be vaccinated while still on therapy.<sup>4</sup>

If DAPTACEL® is administered to persons with an immunodeficiency disorder, or immunosuppressive therapy or after a recent injection of immune globulin, an adequate immunologic response may not occur.

For information regarding simultaneous administration with other vaccines refer to DOSAGE AND ADMINISTRATION. If passive immunization is needed for tetanus or diphtheria prophylaxis, Tetanus Immune Globulin (Human) (TIG), or Diphtheria Antitoxin, if used, should be given in a separate site, with a separate needle and syringe.<sup>3</sup>

**Carcinogenesis, Mutagenesis, Impairment of Fertility:** DAPTACEL® has not been evaluated for its carcinogenic or mutagenic potential or impairment of fertility.

**Pregnancy Category C:** Animal reproduction studies have not been conducted with DAPTACEL®. It is not known whether DAPTACEL® can cause fetal harm when administered to a pregnant woman or can affect reproductive capacity. DAPTACEL® is NOT recommended for use in a pregnant woman.

**Geriatric Use:** This product is NOT recommended for use in adult populations.

**IMMUNITY: SAFETY AND EFFECTIVENESS OF DAPTACEL® IN INFANTS BELOW 6 WEEKS OF AGE HAVE NOT BEEN ESTABLISHED. (See DOSAGE AND ADMINISTRATION.)**

**THIS VACCINE IS NOT RECOMMENDED FOR PERSONS 7 YEARS OF AGE OR OLDER.** Tetanus and Diphtheria Toxoids Adsorbed For Adult Use (Td) is to be used in individuals 7 years of age or older.

**ADVERSE REACTIONS:** Over 11,400 doses of DAPTACEL® have been administered to infants and toddlers in 6 clinical studies. In all, 3,694 children received a total of 3 doses and 476 children received 4 doses of DAPTACEL®.<sup>12,13,14,15,16,17,18</sup>

In the Sweden Efficacy Trial, information on systemic and local reactions were recorded on a standardized diary card kept for 14 days after each dose, and follow-up telephone calls were made 1 and 14 days after each injection. Telephone calls were made monthly to monitor the occurrence of severe events and/or hospitalizations for the 2 months after the last injection. As shown in Table 1, the 2,587 infants who enrolled to receive DAPTACEL® at 2, 4, 6 and 6 months of age had similar rates of reactions within 24 hours as recipients of DT and significantly lower rates than infants receiving whole-cell pertussis.<sup>12,13</sup>

**TABLE 1: PERCENTAGE OF INFANTS FROM SWEDEN I EFFICACY TRIAL WITH LOCAL OR SYSTEMIC REACTIONS WITHIN 24 HOURS POST-DOSE 2, 4 AND 6 OF DAPTACEL® COMPARED WITH DT AND WHOLE-CELL PERTUSSIS DTP VACCINES**

EVENT	Dose 1 (2 MONTHS)			Dose 2 (4 MONTHS)			Dose 3 (6 MONTHS)		
	DAPTACEL® N = 2,587	DT N = 2,574	DTP N = 2,102	DAPTACEL® N = 2,563	DT N = 2,555	DTP N = 2,040	DAPTACEL® N = 2,549	DT N = 2,538	DTP N = 2,001
Local									
Tenderness (Any)	8.0*	8.4	59.5	10.1*	10.3	60.2	10.8*	10.0	50.0
Redness ≥2 cm	0.3*	0.3	6.0	1.0*	0.8	5.1	3.7*	2.4	6.4
Swelling ≥2 cm	0.9*	0.7	10.6	1.6*	2.0	10.0	6.3*	3.9	10.5
Systemic									
Fever† ≥38°C (100.4°F)	7.8*	7.6	72.3	19.1*	18.4	74.3	23.6*	22.1	65.1
Fretfulness††	32.3	33.0	82.1	39.6	39.8	85.4	35.9	37.7	73.0
Anorexia††	11.2*	10.3	39.2	9.1*	8.1	25.6	8.4*	7.7	17.5
Drowsiness††	32.7*	32.0	56.9	25.9*	25.6	50.6	18.9*	20.6	37.6
Crying ≥1 hour	1.7*	1.6	11.8	2.5*	2.7	9.3	1.2*	1.0	3.3
Vomiting	6.9*	6.3	9.5	5.2**	5.8	7.4	4.3	5.2	5.5

N = Number of evaluable subjects. \*p<0.001; DAPTACEL® versus whole-cell pertussis DTP. \*\*p<0.0001; DAPTACEL® versus whole-cell pertussis DTP. † Rectal temperature.

†† Statistical comparisons were not made for this variable. DT: Swedish National Biologics Laboratories; DTP: Aventis Pasteur Inc.

In patients who received DAPTACEL®, the incidence (rates per 1,000 doses) of rectal temperature ≥40°C (104°F) within 48 hours of vaccination was 0.39 following dose 1 and dose 3 and the incidence of persistent crying ≥3 hours within 24 hours of vaccination was 1.16 and 0.39 following doses 1 and 2, respectively.

One case of whole limb swelling and generalized symptoms, with resolution within 24 hours, was observed following dose 2 of DAPTACEL®. No episodes of anaphylaxis or encephalopathy were observed. No seizures were reported within 3 days of vaccination with DAPTACEL®. Over the entire study period, 6 seizures were reported in the DAPTACEL® group, 9 in the DT group and 3 in the whole-cell pertussis DTP group, for overall rates of 2.3, 3.5 and 1.4 per 1,000 vaccinees, respectively. One case of infantile spasms was reported in the DAPTACEL® group. There were no instances of invasive bacterial infection or death.<sup>12,13</sup>

Rates of serious adverse events that are less common than those reported in the Sweden I Efficacy Trial are not known at this time.

Table 2 summarizes the safety results from the Phase II Study in Canada in children who were immunized at 2, 4, 6 and 17-18 months of age with DAPTACEL®. Local and systemic adverse events were consistently less common in DAPTACEL® recipients at 2, 4 and 6 months of age than in those who received whole-cell pertussis DTP vaccine. Following the fourth dose, the same trends were observed, except for rates of severe redness and swelling which did not differ between the 2 vaccine groups. Rates of local reactions of redness and swelling were increased following the fourth dose compared with the first 3 doses as was mild tenderness but there was no increase in severe tenderness.

**TABLE 2: PERCENTAGE OF CHILDREN FROM PHASE II STUDY IN CANADA WITH LOCAL OR SYSTEMIC REACTIONS WITHIN 72 HOURS OF VACCINATION WITH DAPTACEL® AND WHOLE-CELL PERTUSSIS DTP VACCINE AT 2, 4, 6 AND 17-18 MONTHS OF AGE**

EVENT	Dose 1 (2 MONTHS)		Dose 2 (4 MONTHS)		Dose 3 (6 MONTHS)		Dose 4 (18 MONTHS)	
	DAPTACEL® N = 324	DTP N = 108	DAPTACEL® N = 321	DTP N = 106	DAPTACEL® N = 320	DTP N = 104	DAPTACEL® N = 301	DTP N = 97
Local								
Redness								
Any	12.7*	44.4	20.6*	57.5	22.2*	51.9	36.5*	55.7
≥10 mm	1.2*	13.9	7.8*	22.6	10.0*	17.3	27.9	36.1
≥25 mm	0.3*	3.7	0.3*	5.7	1.6	1.9	21.9	20.6
Swelling								
Any	4.3*	23.1	4.3*	32.1	4.7*	25.0	18.6*	28.9
≥10 mm	1.9*	15.7	2.2*	21.7	3.8*	14.4	15.9*	25.8
≥25 mm	0.3*	6.5	0*	5.7	0.9*	4.8	11.3	15.5
Tenderness†								
Any	10.2*	37.0	7.5*	51.9	8.8*	48.1	23.9*	86.6
Moderate + Severe	0.9*	13.0	1.2*	20.8	1.3*	17.3	3.0*	53.6
Severe	0*	4.6	0.3*	7.5	0*	4.8	0.3*	12.4
Systemic								
Fever†								
Any ≥37.5°C (99.5°F)	12.0*	43.7	7.7*	50.0	14.8*	53.2	14.5*	67.9
≥38°C (100.4°F)	0.7	1.9	0	7.8	1.2*	11.7	1.9*	17.9
≥40°C (104°F)	0.3	0	0	1.0	0	1.1	0	0
Irritability†								
Any	41.0*	65.7	41.4*	68.9	40.9*	67.3	36.9*	79.4
Moderate + Severe	9.0*	18.5	6.9*	22.6	5.0*	22.1	5.0*	24.7
Severe	0	1.9	0.3	0	0	1.0	0	2.1
Anorexia‡								
Any	16.0	22.2	9.0*	16.0	11.6*	23.1	17.6*	41.2
Moderate + Severe	1.5	3.7	0.0	2.8	1.3	1.9	2.0*	13.4
Severe	0	0	0.3	0	0	0	0	2.4
Drowsiness§								
Any	43.2	52.8	21.8*	33.0	14.4*	32.7	13.3*	29.9
Moderate + Severe	7.7	8.3	2.8*	7.5	1.3	0	1.0*	6.2
Severe	0	0	0	0	0	0	0	0
Crying ≥3 Hours	0.6	0.9	0.3	0.9	0	1.0	0	1.0

N = Number of evaluable subjects. # DTP: whole-cell pertussis DTP vaccine (Aventis Pasteur Limited). \* Significantly less reactive than whole-cell DTP vaccine, p<0.05. † Moderate = sustained cry with gentle pressure at injection site; Severe = cries when leg is moved. ‡ Temperature measurements were arbitrary. ‡ Number of evaluable subjects for DAPTACEL-DTP = 301/103, DAPTACEL-DTP = 297/94 and 207/78 at 2, 4, 6 and 18 months, respectively. ‡ Moderate = more difficulty settling, even with cuddling; Severe = persistent crying/scrolling and inability to console. ‡ Moderate = missed one or two feeds; Severe = little or no intake for more than two feeds. ‡ Moderate = sleeping much more than normal; Severe = sleeping most of the time with difficulty arousing.

The US Bridging Study was designed, in part, to assess the safety of DAPTACEL® in infants at 2, 4 and 6 months of age, with routinely recommended, concurrently given childhood vaccines (Haemophilus influenzae type b vaccine, DTP and hepatitis B). The incidence of redness, swelling, pain or tenderness at the injection site after each dose was 12.5%, 19.7%, 14.3%, 17.8% and, 15.9% - 30.5% respectively. Fever ≥38°C (100.4°F) was observed in 9.9% - 11.9% of subjects. One afebrile seizure occurred within 24 hours post dose 2 immunization (n = 321).<sup>13</sup>

Additional adverse reactions evaluated in conjunction with pertussis, diphtheria and tetanus vaccination are as follows:

**• As with other aluminum-containing vaccines,** a nodule may be palpable at the injection sites for several weeks. Sterile abscess formation at the site of injection has been reported.<sup>4,9</sup>  
**• Rarely,** anaphylactic reactions (i.e., hives, swelling of the mouth, difficulty breathing, hypotension or shock) have been reported after receiving preparations containing diphtheria, tetanus and/or pertussis antigens.<sup>4</sup>

**Arthus-type hypersensitivity reactions,** characterized by severe local reactions (generally starting 2-8 hours after an injection), may follow receipt of tetanus toxoid. A few cases of peripheral neuropathy have been reported following tetanus toxoid administration, although the evidence is inadequate to accept or reject a causal relation.<sup>2,9</sup>

A review by the Institute of Medicine (IOM) found a causal relation between tetanus toxoid and brachial neuritis and Guillain-Barré syndrome.<sup>21</sup> The following illnesses have been reported as temporally associated with some vaccines containing tetanus toxoid: neurological complications<sup>22,23</sup> including cochlear lesion, brachial plexus neuropathies,<sup>24</sup> paralysis of the radial nerve,<sup>25</sup> paralysis of the anterior lateral aspect of the thigh provides the largest muscle and is the preferred site, the deltoid muscle is usually large enough for I.M. injection. The vaccine should not be injected into the gluteal area or areas where there may be a major nerve trunk.<sup>1</sup>

Do NOT administer this product intravenously or subcutaneously.

**Immunization Series:** A 0.5 mL dose of DAPTACEL® is approved for administration as a 4 dose series at 2, 4 and 6 months of age, at the discretion of the health-care provider for the first dose at 2 months of age, but not earlier than 6 weeks of age, and for the seventh birthday. The interval between the third and fourth dose should be at least 6 months. It is recommended that DAPTACEL® be given for all doses in the series because no data on the interchangeability of DAPTACEL® with other DTP vaccines exist. At this time, data are insufficient to establish the frequency of adverse events following a fifth dose of DAPTACEL® in children who have previously received 4 doses of DAPTACEL® or DAPTACEL® may be used to complete the immunization series in infants who have received 1 or more doses of whole-cell pertussis DTP. However, the safety and efficacy of DAPTACEL® in such infants have not been fully demonstrated.<sup>2</sup>

**PERSONS 7 YEARS OF AGE AND OLDER SHOULD NOT BE IMMUNIZED WITH DAPTACEL® OR ANY OTHER PERTUSSIS-CONTAINING VACCINES.** DAPTACEL® should not be combined through concomitant or mixed with any other vaccine, if any recommended dose of pertussis vaccine cannot be given, DT (For Pediatric Use) should be given as needed to complete the series. Pre-term infants should be vaccinated according to their chronological age from birth.<sup>1</sup>

Interruption of the recommended schedule with a delay between doses should not interfere with the final immunity achieved with DAPTACEL®. There is no need to start the series over again, regardless of the time between doses.

**STORAGE:** DAPTACEL® should be stored at 2° to 8°C (35° to 46°F). DO NOT FREEZE. Product which has been exposed to freezing should not be used. Do not use after expiration date.

**REFERENCES:**

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