

## Food Allergy

### **Guidelines for the Diagnosis and Management of Food Allergy in the United States: Summary of the NIAID-Sponsored Expert Panel Report**

J.A. Boyce, A. Assa'ad, A.W. Burks, S.M. Jones, H.A. Sampson, R.A. Wood, et al.

*Journal of Allergy and Clinical Immunology*, Vol. 126, No. 6; pp. 1105-1118, 2010

Link to full text: [http://www.jacionline.org/article/S0091-6749\(10\)01569-1/fulltext](http://www.jacionline.org/article/S0091-6749(10)01569-1/fulltext)

**Significance:** This report presents best practice clinical guidelines for the diagnosis and management of food allergy in the U.S.

Food allergy (FA) is an important public health problem that affects adults and children and may be increasing in prevalence. Despite the risk of severe allergic reactions and even death, there is no current treatment for FA: the disease can only be managed by allergen avoidance or treatment of symptoms. Moreover, the diagnosis of FA may be problematic, given that nonallergic food reactions, such as food intolerance, are frequently confused with FAs. Due to these concerns, the National Institute of Allergy and Infectious Diseases and more than 30 professional organizations, federal agencies, and patient advocacy groups, led the development of “best practice” clinical guidelines for the diagnosis and management of FA. The Guidelines were developed by and designed for medical practitioners and researchers in various fields of medicine. They focus on diseases that are defined as FA and include both IgE-mediated reactions to food and some non-IgE-mediated reactions to food.

### **Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA): A summary report**

A. Fiocchi, H.J. Schünemann, J. Brozek, P. Restani, K. Beyer, R. Troncone, et al.

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**Significance:** This report summarizes the first consensus-based approach to the management of cow's milk allergy.

At the 2nd Milan Meeting on Adverse Reactions to Bovine Proteins, the contributions in allergen science, epidemiology, natural history, evidence-based diagnosis, and therapy synthesized in the World Allergy Organization Diagnosis and Rationale for Action against Cow's Milk Allergy guidelines were presented. A consensus emerged between discussants that cow's milk allergy management should reflect not only basic research but also a newer and better appraisal of the literature in the light of the values and preferences shared by patients and their caregivers in partnership. In the field of diagnosis, atopy patch testing and microarray technology have not yet evolved for use outside the research setting. With foreseeable breakthroughs (e.g., immunotherapy and molecular diagnosis) in the

offing, the step ahead in leadership can only stem from a worldwide organization implementing consensus-based clinical practice guidelines to diffuse and share clinical knowledge.

### **Maternal Consumption of Peanut during Pregnancy is associated with Peanut Sensitization in Atopic Infants**

S.H. Sicherer, R.A. Wood, D. Stablein, R. Lindblad, A.W. Burks, A.H. Liu, et al.

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Link to full text: [http://www.jacionline.org/article/S0091-6749\(10\)01334-5/fulltext](http://www.jacionline.org/article/S0091-6749(10)01334-5/fulltext)

**Significance:** Maternal ingestion of peanut during pregnancy was strongly associated with a high level of peanut sensitization.

This study identified factors associated with peanut sensitization in 503 infants, 3-15 months of age, with likely milk or egg allergy but no previous diagnosis of peanut allergy. A total of 308 had experienced an immediate allergic reaction to cow's milk and/or egg, and 204 had moderate to severe atopic dermatitis and a positive allergy test to milk and/or egg. A peanut IgE level  $\geq 5$  kUA/L was considered likely indicative of peanut allergy. A total of 140 infants had peanut IgE levels  $\geq 5$  kUA/L. Multivariate analysis showed frequent peanut consumption during pregnancy (OR=2.9; 95%CI, 1.7-4.9), IgE levels to milk ( $P=.001$ ) and egg ( $P<.001$ ), male sex ( $P=.02$ ), and nonwhite race ( $P=.02$ ) to be the primary factors associated with peanut IgE  $\geq 5$  kUA/L. Frequency of peanut consumption during pregnancy and breast-feeding showed a dose-response association with peanut IgE  $\geq 5$  kUA/L, but only consumption during pregnancy was a significant predictor. Among 71 infants never breast-fed, frequent consumption of peanut during pregnancy was strongly associated with peanut IgE  $\geq 5$  kUA/L (OR=4.99, 95%CI, 1.69-14.74).

## **Acrylamide**

### **Modelling the Effect of Asparaginase in Reducing Acrylamide Formation in Biscuits**

M. Anese, B. Quarta, J. Frias

*Food Chemistry*, Vol. 126, No. 2; pp. 435-440, 2010

Link to full text: [http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6T6R-51D7J13-6-P&\\_cdi=5037&\\_user=10&\\_pii=S0308814610014147&\\_origin=browse&\\_coverDate=05%2F15%2F2011&\\_sk=998739997&\\_view=c&\\_wchp=dGLbVlb-zSkzk&\\_md5=65e5cea4c1f2e3d2d91bc24caf49b3aa&\\_ie=/sdarticle.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6T6R-51D7J13-6-P&_cdi=5037&_user=10&_pii=S0308814610014147&_origin=browse&_coverDate=05%2F15%2F2011&_sk=998739997&_view=c&_wchp=dGLbVlb-zSkzk&_md5=65e5cea4c1f2e3d2d91bc24caf49b3aa&_ie=/sdarticle.pdf)

**Significance:** Asparaginase addition did not significantly affect the colour of the final product, although the quadratic term of the incubation temperature did slightly.

The influence of asparaginase on acrylamide formation, as well as colour development, in short dough biscuits was studied. In particular, asparaginase concentration, incubation time and temperature were changed according to an experimental design. As acrylamide formation was found to vary significantly between biscuits obtained by using the same ingredients and process, a mixed effect model was used to model variation of acrylamide concentration. By

contrast a fixed effect model was used for colour polynomial analysis. Within the range of study, the overall results allowed the best conditions for minimising acrylamide formation to be found. It can be suggested that acrylamide development was at a minimum at intermediate asparaginase concentrations, as well as at the lowest time and temperature of incubation.

### **Acrylamide – A Case Study on Risk Analysis**

L. Busk

*Food Control*, Vol. 21, No. 12; pp. 1677-1682, 2010

Link to full text: [http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6T6S-50CVPY7-1-3&\\_cdi=5038&\\_user=10&\\_pii=S0956713510001660&\\_origin=search&\\_coverDate=12%2F31%2F2010&\\_sk=999789987&view=c&wchp=dGLzVlb-zSkWb&md5=9523666bd5d5bdec5ac5badefd102b74&ie=/sdarticle.pdf](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6T6S-50CVPY7-1-3&_cdi=5038&_user=10&_pii=S0956713510001660&_origin=search&_coverDate=12%2F31%2F2010&_sk=999789987&view=c&wchp=dGLzVlb-zSkWb&md5=9523666bd5d5bdec5ac5badefd102b74&ie=/sdarticle.pdf)

**Significance:** If the steps presented in this paper had been introduced in 2002, it would have led to a more efficient risk management of acrylamide.

The concept of risk analysis, as defined by the WHO, foresees strict functional separation between risk assessment and risk management. However, at the same time, it also expects close cooperation between risk assessors and risk managers. This is not always the case, as exemplified by acrylamide, a heat-induced toxicant in foods. The proposed SAFE FOOD Risk Analysis Framework puts forward the need for institutionalizing the cooperation between assessors and managers by introducing two steps, framing and evaluation.

## **Special Report**

### **Foodborne Illness Acquired in the United States—Major Pathogens**

E. Scallan, R.M. Hoekstra, F.J. Angulo, R.V. Tauxe, M-A. Widdowson, S.L. Roy, et al.

*Emerging Infectious Diseases*, January 2011, Vol. 17, No. 1, 2010

Link to full text: <http://www.cdc.gov/eid/content/17/1/7.htm>

**Significance:** This article provides new estimates of foodborne diseases acquired in the U.S.

Estimates of foodborne illness can be used to direct food safety policy and interventions. Data from active and passive surveillance and other sources were used to estimate that each year 31 major pathogens acquired in the U.S. caused 9.4 million episodes of foodborne illness (90% credible interval [CrI] 6.6–12.7 million), 55,961 hospitalizations (90% CrI=39,534–75,741), and 1,351 deaths (90% CrI=712–2,268). Most (58%) illnesses were caused by norovirus, followed by nontyphoidal *Salmonella* spp. (11%), *Clostridium perfringens* (10%), and *Campylobacter* spp. (9%). Leading causes of hospitalization were nontyphoidal *Salmonella* spp. (35%), norovirus (26%), *Campylobacter* spp. (15%), and *Toxoplasma gondii* (8%). Leading causes of death were nontyphoidal

*Salmonella* spp. (28%), *T. gondii* (24%), *Listeria monocytogenes* (19%), and norovirus (11%). These estimates cannot be compared with prior (1999) estimates to assess trends because different methods were used.

### **Foodborne Illness Acquired in the United States—Unspecified Agents**

E. Scallan, P.M. Griffin, F.J. Angulo, R.V. Tauxe, R.M. Hoekstra  
*Emerging Infectious Diseases*, January 2011, Vol. 17, No. 1, 2010  
Link to full text: <http://www.cdc.gov/EID/content/17/1/16.htm>

**Significance:** This article provides estimates of foodborne gastroenteritis illnesses, hospitalizations, and deaths in the U.S.

Each year, 31 major known pathogens acquired in the U.S. caused about 9.4 million episodes of foodborne illness. Additional episodes of illness were caused by unspecified agents, including known agents with insufficient data to estimate agent-specific illness, known agents not yet recognized as causing foodborne illness, substances known to be in food but of unproven pathogenicity, and unknown agents. To estimate these additional illnesses, data from surveys, hospital records, and death certificates were used to estimate illnesses, hospitalizations, and deaths from acute gastroenteritis and subtracted illnesses caused by known gastroenteritis pathogens. If the proportions acquired by domestic foodborne transmission were similar to those for known gastroenteritis pathogens, then an estimated 38.4 million (90% credible interval [CrI] 19.8–61.2 million) episodes of domestically acquired foodborne illness were caused by unspecified agents, resulting in 71,878 hospitalizations (90% credible intervals (CrI)=9,924–157,340) and 1,686 deaths (90% CrI=369–3,338).

## **Salmonella**

### **Natural-Light Labeling of Tomatoes Does Not Facilitate Growth or Penetration of *Salmonella* into the Fruit**

M.D. Danyluk, L.O. Interiano Villeda, L.M. Friedrich, K.R. Schneider, E. Etxeberria  
*Journal of Food Protection*, Vol. 73, No. 12; pp. 2276-2280, 2010  
Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00018>

**Significance:** The inability of *P. carotovorum* and *Salmonella* to colonize natural-light-etched surfaces of tomato fruit indicates that the use of this technology does not adversely compromise the surface of tomatoes.

The survival-growth capacity of *Salmonella* populations on tomato epidermis labeled by a natural-light labeling system was investigated after persistent fears of such marks serving as possible entryways for the pathogenic organisms, alone and in the presence of *Pectobacterium carotovorum* subsp. *carotovorum*, a soft-rot organism. Different treatments involving natural-light labeling, fruit waxing, and a five-strain cocktail of *Salmonella* were applied to mature green tomato surfaces in different sequences prior to storage at 4, 12, or 25°C. There were no significant differences between treatments or between treatments and controls throughout. The cuticle and epidermal

interruptions caused by natural-light labeling do not facilitate the penetration and colonization of the tomato pericarp.

### **Effect of *Salmonella* Vaccination of Breeder Chickens on Contamination of Broiler Chicken Carcasses in Integrated Poultry Operations**

F.C. Dórea, D.J. Cole, C. Hofacre, K. Zamperini, D. Mathis, M.P. Doyle, et al.

*Applied and Environmental Microbiology*, Vol. 76, No. 23; pp. 7820-7825, 2010

Link to full text: <http://aem.asm.org/cgi/content/full/76/23/78200>

**Significance:** Investigation of other company-associated factors did not indicate that the difference between poultry operations could be attributed to measures other than the vaccination program.

This study determined the impact of *Salmonella* vaccination on commercial poultry operations by monitoring four vaccinated and four nonvaccinated breeder chicken flocks and comparing *Salmonella* prevalences in these flocks and their broiler, meat bird progeny. For one poultry company, young breeders were vaccinated with a live-attenuated *Salmonella enterica* serovar Typhimurium vaccine followed by a killed *Salmonella* bacterin consisting of *S. enterica* serovar Berta and *S. enterica* serovar Kentucky. The other participating poultry company did not vaccinate their breeders or broilers. Vaccinated hens had a significantly lower prevalence of *Salmonella* in the ceca and the reproductive tracts. A significantly lower *Salmonella* prevalence in broiler chicks was observed, acquired from vaccinated breeders, when placed at the broiler farms contracted with the poultry company. Broiler chicken farms populated with chicks from vaccinated breeders also tended to have significantly fewer environmental samples containing *Salmonella*. There was a significantly lower *Salmonella* prevalence in broilers entering the processing plants for the poultry company that utilized this *Salmonella* vaccination program for its breeders.

## **E. Coli**

### **Inoculation of Beef with Low Concentrations of *Escherichia coli* O157:H7 and Examination of Factors That Interfere with Its Detection by Culture Isolation and Rapid Methods**

J.M. Bosilevac, N. Kalchayanand, J.W. Schmidt, S.D. Shackelford, T.L. Wheeler, M. Koohmaraie

*Journal of Food Protection*, Vol. 73, No. 12; pp. 2180-2188, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00004>

**Significance:** Increased fat content correlated with decreasing recovery of immunomagnetic separation beads, but this was not observed to interfere with detection of *E. coli* O157:H7.

A protocol for generating a control inoculum to detect *Escherichia coli* O157:H7 in samples of beef trim or ground beef at levels as low as 1 CFU/375 g is presented and evaluated. Half of all samples received no cells when 1 CFU was the target concentration and that targets >3 CFU were much more reliable. Detection by culture isolation and two commercial assays, Qualicon BAX-MP and BioControl GDS, detected 94%±11%, 92%±10%, and 92%±7% of

samples inoculated with 5.4 CFU (range 1-9 CFU), respectively. The effect of background aerobic plate count (APC) bacteria and fat content effects on the detection of *E. coli* was examined. At APC concentrations <6 log CFU/g, the rapid methods detected all beef trim samples inoculated with 26 CFU of *E. coli*/65 g. At an APC of 6.7 log CFU/g, culture, BAX-MP, and GDS detected 100, 75, and 13%, respectively, of inoculated samples. Neither commercial method detected *E. coli* in the samples when APC was 7.7 log CFU/g, whereas culture was able to detect 63% of *E. coli* in the samples when APC was at this concentration.

### **Effect of Citral on the Thermal Inactivation of *Escherichia coli* O157:H7 in Citrate Phosphate Buffer and Apple Juice**

L. Espina, M. Somolinos, R. Pagán, D. García-Gonzalo

*Journal of Food Protection*, Vol. 73, No. 12; pp. pp. 2189-2196, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00005>

**Significance:** A combined process of heat and citral can inactivate *E. coli* O157:H7 cells and reduce their potential negative effects.

Inactivation and sublethal injury of *Escherichia coli* O157:H7 cells induced by heat in citrate phosphate buffer and apple juice (both at pH 3.8) was studied, and the effect of a combined preservation treatment using citral and heat treatments was determined. Heat resistance of *E. coli* was similar in both treatment media; after 27 min at 54°C, 3 log units of the initial cell population was inactivated in both treatment media. However, under less harsh conditions a protective effect of apple juice was found. Whereas inactivation followed linear kinetics in the citrate phosphate buffer, when cells were treated in apple juice the survival curves were concave downward. Heat treatment caused a great degree of sublethal injury; 4 min at 54°C inactivated <0.5 log CFU/ml but sublethally injured >3 log CFU/ml. The addition of 18 and 200 ppm of citral to the treatment medium acted synergistically with heat at 54°C to inactivate  $3 \times 10^4$  and  $3 \times 10^7$  CFU/ml, respectively. Addition of citral reduced the time needed to inactivate 1 log unit of the initial *E. coli* population from 8.9 to 1.7 min.

### **Behavior of *Escherichia coli* O157:H7 during the Manufacture and Aging of Gouda and Stirred-Curd Cheddar Cheeses Manufactured from Raw Milk**

D.J. D'Amico, M.J. Druart, C.W. Donnelly

*Journal of Food Protection*, Vol. 73, No. 12; pp. 2217-2224, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00009>

**Significance:** The 60-day aging requirement alone is insufficient to completely eliminate levels of viable *E. coli* O157:H7 in Gouda or stirred-curd Cheddar cheese manufactured from raw milk contaminated with low levels of this pathogen.

This study examined the fate of *Escherichia coli* O157:H7 during the manufacture and aging of Gouda and stirred-curd Cheddar cheeses made from raw milk. Cheeses were manufactured from unpasteurized milk experimentally

contaminated with one of three strains of *E. coli* at an approximate population level of 20 CFU/ml. Bacterial counts in both cheese types increased almost 10-fold from initial inoculation levels in milk to approximately 145 CFU/g found in cheeses on day 1. From this point, counts dropped significantly over 60 days to mean levels of 25 and 5 CFU/g in Cheddar and Gouda, respectively. Levels of *E. coli* fell and stayed below 5 CFU/g after an average of 94 and 108 days in Gouda and Cheddar, respectively, yet remained detectable after selective enrichment for more than 270 days in both cheese types. Changes in pathogen levels observed throughout manufacture and aging did not significantly differ by cheese type.

## Foodborne Pathogens

### Validation of Lactic Acid Bacteria, Lactic Acid, and Acidified Sodium Chlorite as Decontaminating Interventions To Control *Escherichia coli* O157:H7 and *Salmonella* Typhimurium DT 104 in Mechanically Tenderized and Brine-Enhanced (Nonintact) Beef at the Purveyor

**Significance:** The application of antimicrobials by purveyors prior to mechanical tenderization or enhancement of steaks should increase the safety of these types of products.

A. Echeverry, J.C. Brooks, M.F. Miller, J.A. Collins, G.H. Loneragan, M.M. Brashears

*Journal of Food Protection*, Vol. 73, No. 12; pp. 2169-2179, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00003>

This study validated the use of lactic acid bacteria (LAB), acidified sodium chlorite (ASC), and lactic acid (LA) sprays when applied under a simulated purveyor setting as effective interventions to control and reduce *Escherichia coli* O157:H7 and *Salmonella* Typhimurium DT 104 in inoculated USDA Choice strip loins pieces intended for either mechanical blade tenderization or injection enhancement with a brine solution after an aging period of 14 or 21 days at 4.4°C under vacuum. After the mechanical process, translocation of *E. coli* O157:H7 and *Salmonella* Typhimurium DT 104 from the surface into the internal muscles occurred at levels between 1.00 and 5.72 log CFU/g, compared with controls. LAB and LA reduced internal *E. coli* O157:H7 loads up to 3.0 log, while ASC reduced the pathogen 1.4-2.3 log more than the control ( $P<0.05$ ), respectively. *Salmonella* Typhimurium DT 104 was also reduced internally 1.3-2.8, 1.0-2.3, and 1.4-1.8 log after application of LAB, LA, and ASC, respectively.

### Inactivation Kinetics and Virulence Potential of *Salmonella* Typhimurium and *Listeria monocytogenes* Treated by Combined High Pressure and Nisin

J. Gou, H-Y. Lee, J. Ahn

*Journal of Food Protection*, Vol. 73, No. 12; pp. 2203-2210, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00007>

**Significance:** The combination of high pressure and nisin could noticeably suppress the expression of virulence-associated genes.

The physiological and molecular changes of *Salmonella* Typhimurium and *Listeria monocytogenes* in deionized water (DIW) and nisin solutions (100 IU/g) during high pressure processing (HPP) were characterized. Strains of *Salmonella* Typhimurium and *L. monocytogenes* in DIW or nisin solutions were subjected to 200, 300, and 400 MPa for 20 min. *Salmonella* Typhimurium and *L. monocytogenes* populations were reduced to <1 CFU/ml in DIW and nisin solutions under 400 MPa. The highest *b* value was 5.75 for *Salmonella* Typhimurium in nisin solution under 400 MPa. *L. monocytogenes* was more sensitive to pressure change when suspended in DIW than when suspended in nisin. The pressure sensitivity of both *Salmonella* Typhimurium and *L. monocytogenes* was higher in DIW solution (141-243 MPa) than in nisin solution (608-872 MPa). No recovery of HPP-injured cells in DIW and nisin solutions treated at 400 MPa was observed after 7 days of refrigerated storage. The heterogeneity of HPP-treated cells was revealed in flow cytometry dot plots. The transcripts of *stn*, *invA*, *prfA*, and *inlA* were relatively down-regulated in HPP-treated nisin solution.

#### **Effect of Slightly Acidic Electrolyzed Water for Inactivating *Escherichia coli* O157:H7 and *Staphylococcus aureus* Analyzed by Transmission Electron Microscopy**

S. Nan, L.I. Yongyu, L.I. Baoming, C. Wang, X. Cui, W. Cao

*Journal of Food Protection*, Vol. 73, No. 12; pp. 2211-2216, 2010

Link to full text: <http://www.ingentaconnect.com/content/iafp/jfp/2010/00000073/00000012/art00008>

**Significance:** Slightly acidic electrolyzed water with a near neutral pH may be a promising disinfectant for inactivation of foodborne pathogens.

The use of different available chlorine concentrations (ACCs) of slightly acidic electrolyzed water (SAEW; 0.5 to 30 mg/liter), different treatment times, and different temperatures for inactivating *Escherichia coli* O157:H7 and *Staphylococcus aureus* was evaluated. A 3-min treatment with SAEW (pH 6.0-6.5) at ACCs of 2 mg/liter for *E. coli* O157:H7 and 8 mg/liter for *S. aureus* resulted in 100% inactivation of two cultures (7.92- to 8.75-log reduction) at 25°C. The bactericidal activity of SAEW was independent of the treatment time and temperature at a higher ACC ( $P>0.05$ ). *E. coli* O157:H7 was much more sensitive than *S. aureus* to SAEW. The morphological damage to *E. coli* O157:H7 cells by SAEW was significantly greater than that to *S. aureus* cells. At an ACC as high as 30 mg/liter, *E. coli* O157:H7 cells were damaged, but *S. aureus* cells retained their structure and no cell wall damage or shrinkage was observed.

#### ***Clostridium botulinum* Neurotoxin Type B Is Heat-Stable in Milk and Not Inactivated by Pasteurization**

R. Rasooly, P.M. Do

*Journal of Agricultural and Food Chemistry*, Vol. 58, No. 23; pp. 12557-12561, 2010

Link to full text: <http://pubs.acs.org/doi/full/10.1021/jf10283988>

**Significance:** The commonly used food processes such as acidity and pasteurization are more effective in inactivating BoNT serotype A than serotype B when conventional pasteurization is used.

Noninvasive methods were used to simultaneously detect and distinguish between active botulinum neurotoxins (BoNT) serotypes A and B in one reaction and sample. An enzymatic activity assay employing internally quenched fluorogenic peptides corresponding to SNAP-25, for BoNT-A, and VAMP2, for BoNT-B was developed as an alternative method to the *in vivo* mouse bioassay. Because each peptide is labeled with different fluorophores, the two toxins were distinguishable. This method was used to analyze the heat stability of BoNT-A and BoNT-B. This study reports that conventional milk pasteurization (63 °C, 30 min) inactivated BoNT serotype A; however, serotype B is heat-stable in milk and not inactivated by pasteurization.