FOOD ALLERGIES – FROM CHAOS, CONFUSION, AND CONCERN COMMITMENT AND CONTROL

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THE APPEARANCE OF FOOD ALLERGIES AS A PUBLIC HEALTH ISSUE

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Historical Perspective

- Food allergies have been around forever but seem to be increasing in prevalence and severity
- Food allergies ignored until late 1980s
- The awakening period:
  - Clinical (1988 – 1992 to now)
  - GMO concerns (1990 – 1996 to now)
  - Consumer awareness (1991 – 2000 to now)
  - Food industry (1992 – January 1997 to now)
  - Regulatory (1996 – 2006 to now)

Chaos – The Beginning
The Awakening for Public Health Authorities

- 8 deaths reported from food allergies by Mayo Clinic group in 1988 – JAMA
- 12 deaths and near-deaths reported by Johns Hopkins group in 1992 – NEJM

The Clinical Awakening

- Food allergy identified as a significant cause of dermatitis in young children – 1985
- 8 deaths reported from food allergies by Mayo Clinic group in 1988 – JAMA
- Double-blind, placebo-controlled food challenge recommended clinical protocol - 1988
- 12 deaths and near-deaths reported by Johns Hopkins group in 1992 – NEJM

The GMO Awakening

- GMO: The Brazil nut gene into GM soybeans accomplished in 1990 but allergy risk identified in 1996 – NEJM
- International Food Biotechnology Council develops first decision tree approach for allergenicity assessment of GMOs in 1996
- StarLink corn debacle in 2000
- FAO/WHO Expert Consultation on allergenicity assessment of GM foods in 2001
- Codex Alimentarius Commission adopts allergenicity assessment approach in 2003

Consumer Awakening

- Slow but steady
- Anaphylaxis Canada and Anaphylaxis Campaign (U.K.) begin to increase focus on food allergies in early 1990s due to unfortunate fatalities
- FAAN (now FARE) formed in 1991
- Food Allergy & Anaphylaxis Alliance International forms in late 1990s

International Chaos

- Canada leads the way from late 1980's
  - Severe reaction at food industry party
  - Several highly publicized deaths from peanuts
  - Sabrina's Law in Ontario
  - Schools ban peanuts
  - CFIA begins to initiate recalls
  - CFIA accepts "may contain" labeling

International Chaos

- Several deaths in Canada lead to increased consumer awareness and Anaphylaxis Canada formation
- Several deaths occur in U. K.
  - D. Reading's daughter leading to Anaphylaxis Campaign
- Sweden develops allergy death reporting system; France develops French AllergoVigilance Network
- Death of Sabrina Shannon in 1995 in Canada leads to Sabrina's law and peanut bans from schools in Ontario

International Chaos

- FAO initiates development of Big 8 in 1995
- Codex Alimentarius Commission adopts Big 8 in 1999
- FSANZ first to enact food allergen regulation - 1999
- Canadian government is first to do testing for allergen residues – late 1990's
- EU Directive 2000/13/EC
- EU Directive 2003/89/EC – the Big 12 later amended to the present Big 14
- EU approves source labeling exemptions for some ingredients derived from allergenic sources – 2007

Chaos – The Beginning
The Awakening for Industry

- FDA recalls begin in earnest in 1992
- FDA Notice to Manufacturers in 1996
- Breyer's Ice Cream Recall in 1994 (Kraft Foods)
- Kellogg's Rice Krispy Treats cereal – 1996
- General Mills recalls – January 1997
- Codex Alimentarius Allergen List in 1999 (Big 8)
- Peanut allergy serves as a good example

Chaos – The Peanut Example

- In the beginning – ice cream, chocolate, cookies
- That's controllable (or can be easily labeled)
- These situations led industry to begin to develop and implement preventive allergen controls
- Also, led industry to begin to implement precautionary allergen labeling (PAL) e.g. "may contain peanuts"

Chaos – Where Will Peanuts Be Found Next?

- But then you get the unusual
- Pickle relish
- Honey
- Baby carrots
- Chocolate liquor
- Herbal tea bags
- Mosquito coils – is inhaling smoke dangerous
- Lawn aeration treatments
- Home insulation

Chaos – And Then We Wake Up to the Realities of Agricultural Comingling

- Pickle relish
- Honey
- Baby carrots
- Chocolate liquor
- Herbal tea bags
- Mosquito coils – is inhaling smoke dangerous?
- Lawn aeration treatments
- Home insulation
- Cumin
- Garlic
- Wheat Flour

Chaos – Future Peanut Surprises

- There are >300 edible species of legumes including peanuts
- Among legumes, peanut is the most common and most severe food allergy
- Soybean is recognized as a commonly allergenic food also but not nearly as common or potent
- Few cross reactions occur between peanut and other legumes but they do occasionally occur and especially with high dose exposures
- This clashes with high protein trend

Chaos – Future Peanut Surprises

- Soybean and high protein dairy/soy beverage
- Lupine – the replacement for GM soy in EU
- Fenugreek – the spicy surprise
- Pea protein – happening now in the U.S. and Canada

Chaos

Initial Industry Response
Concern but Confusion

1990
Industry Status on Food Allergens

- Lack of knowledge and awareness
- Lessons from the sulfite issue of 1980's
- Resistance to change
- Complex web
- Lack of recognition of vulnerability
- Focus on the minutiae

Key Food Industry Lessons

- Major company recalls
  - Rework
  - Inadequate cleaning of shared equipment
  - Line cross-overs
  - Packaging errors
  - Ingredient suppliers
  - Custom processors

Key Needs – 1990 (Chaos)

- Analytical methods to detect allergen residues
- System to prioritize the most important allergenic foods
- Clearer labeling of allergenic foods
- Understanding of allergenicity of ingredients derived from allergenic sources
- Improved consumer awareness of the risks of food allergy
- Enhanced clinical awareness of food allergy diagnosis and better diagnostic approaches
- Effective treatment of food allergies
- Clinical awareness of potential severity and increased access to epinephrine
- Better food industry allergen control

Food Industry Response Commitment

- Institution of improved GMP's
- Institution of improved sanitation practices
- Changes in facility and equipment design
- Employee and management training
- Food Allergy Issues Alliance
- Industry support for consumer groups
- Creation of Food Allergy Research & Resource Program

FOOD ALLERGENS – WHERE ARE WE NOW?

Why Food Allergies & Sensitivities Have Become a Priority Public Health Concern

- Consumers are very aware and have high expectations
- Estimated 4-8% of consumers have food allergies in developed countries
- Reactions can occasionally be quite severe, even fatal
- Reactions happen immediately after ingestion
- Threshold dose for provoking a reaction is quite low
- Avoidance is the only strategy for reaction prevention
- Undeclared allergens are a leading cause of recalls

Why Food Allergies & Sensitivities Have Become a Priority Public Health Concern

- As many as 1% of consumers in some countries have celiac disease
- Another large group of consumers (is this only a U.S. phenomenon?) claim to have other forms of gluten sensitivity
- Allergen/gluten control is challenging for the food industry
  - How much is too much?
  - How clean is clean enough?

Key Developments

- The analytical toolbox is pretty full
- Codex identification of the Big 8
- Regulations enacted to improve allergen identification on labels
- Consumer groups have led efforts to increase consumer awareness in several countries
- Diagnostic practices are improving
- Epinephrine access has improved (in some countries)
- New treatment modalities are under development
- LEAP results begin to show why increased prevalence
- Allergen control has been vastly improved by food industry

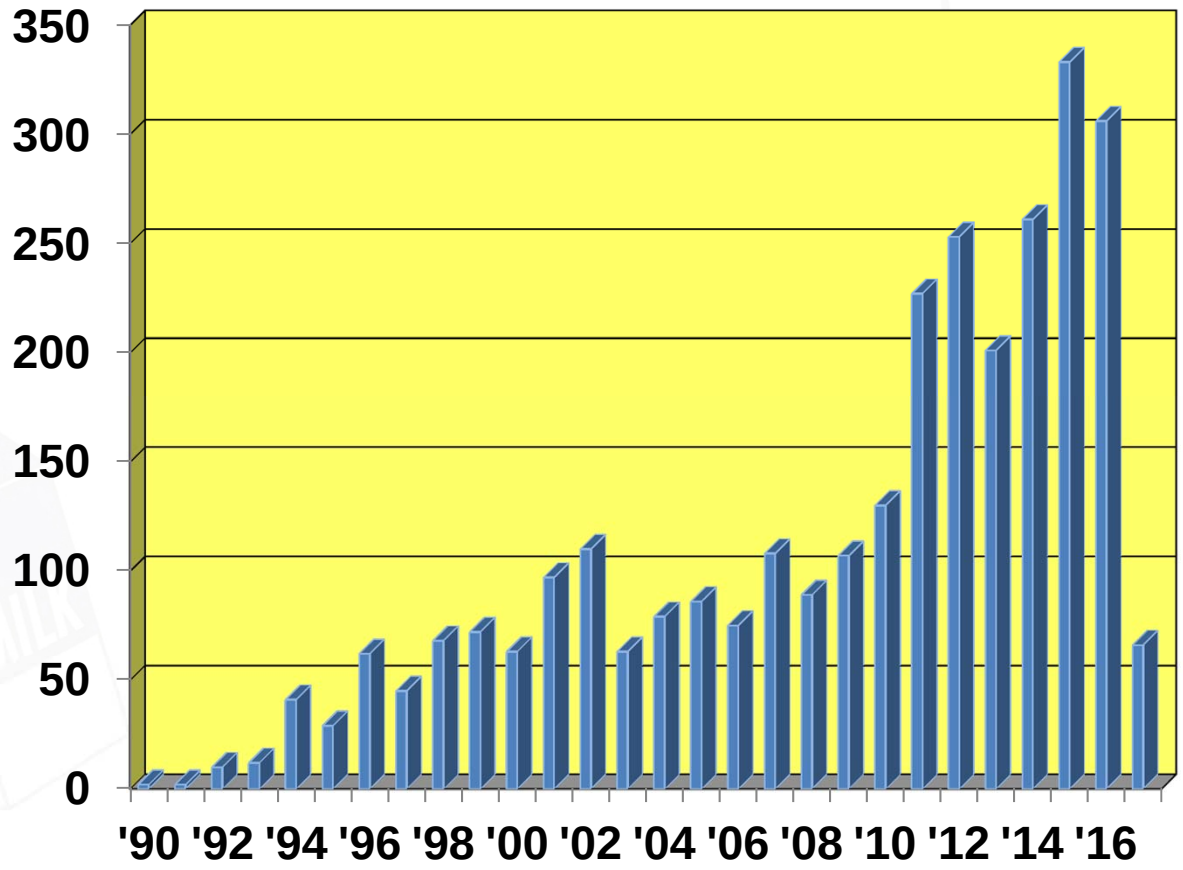
Are We Done?

- Public health authorities have largely failed to develop transparent risk assessment methods
- Do not fully trust ELISA results
- No confirmatory methods – mass spectrometry
- Countries add foods to priority allergen lists without evidence of prevalence, potency or severity
  (celery – really??)
- A zero threshold approach abounds
- Labeling practices (required and voluntary) bear almost no relationship to risk
- Food industry does not do risk assessment either

Are We Done?

- Companies apply precautionary labeling to wide variety of packaged foods
- Many food-allergic consumers ignore precautionary labels
- Precautionary labeling has almost completely lost its effectiveness
- Few public health authorities have adopted thresholds (hooray for Japan – 10 ppm)
- Auditors run amok with variable expectations
- Food-allergic consumers still die and often without access to epinephrine

U.S. FDA Food Allergen Recall Incidents 1988-2017



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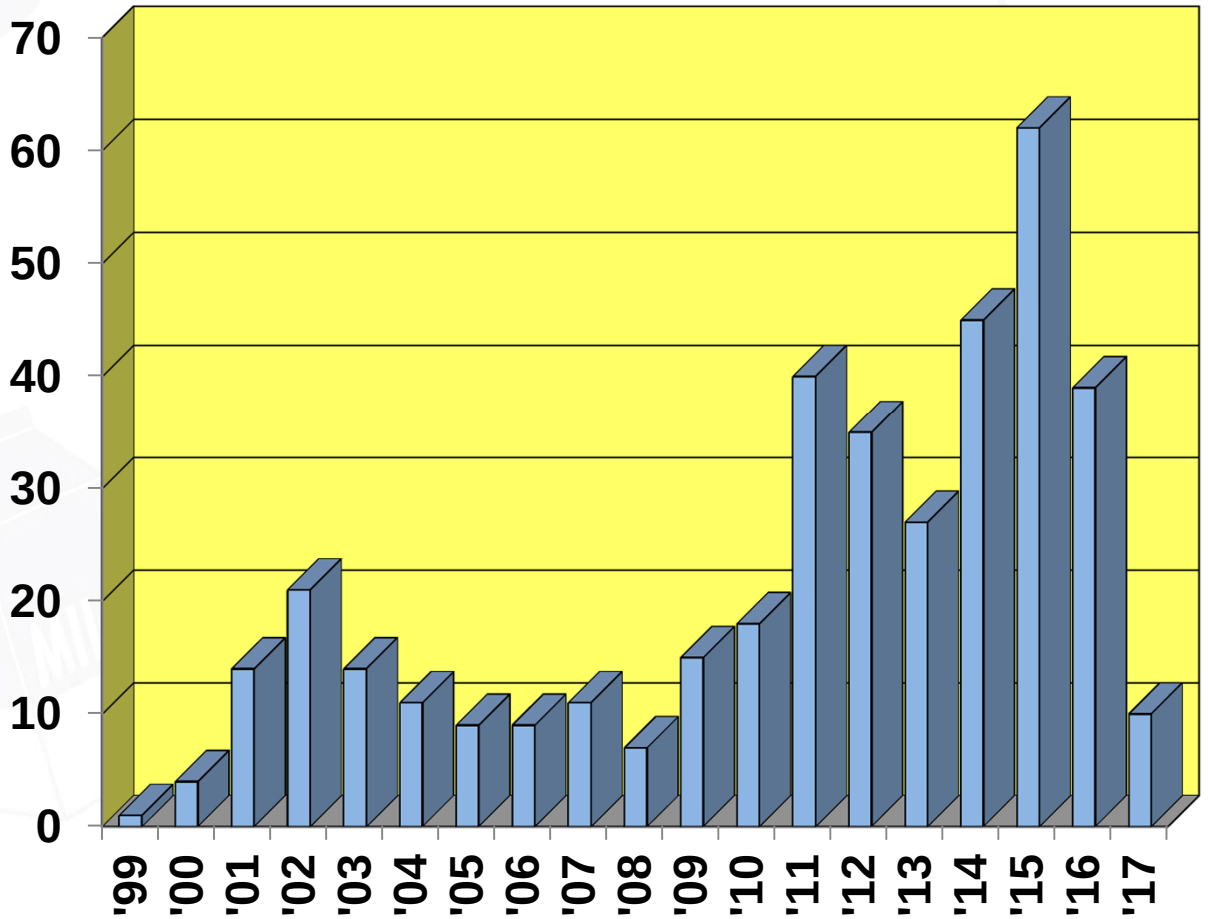
FSIS/ USDA Food Allergen Recalls Calendar Years 1999-2017



Research Progress: 1995 to Now

- Analytical test development focused on ELISAs – specific, sensitive, detected proteins, rugged formats
- Commercial ELISA test kits now abound on a worldwide basis – 14 different companies
- Peanut, milk, egg, almond, hazelnut, walnut, cashew, pistachio, macadamia, coconut, soybean, gluten, crustacea, mustard, buckwheat, lupine, sesame seed
- A few missing: some tree nuts, fish
- Quantitative 96-well, swab, lateral flow strip
- Industry now has the tools to assess ACP

Nirvana – The Ideal Future

- Clinicians learn that weaning practices are key to prevent sensitization to foods
- Learn to identify the vulnerable infants
- Learn when is best to implement altered weaning practices
- Public accepts this change in strategy
- Food industry assists by developing the right products for the new weaning practices
- Likelihood – near term (2-5 yrs)

Nirvana – The Ideal Future

- Clinicians develop effective therapeutic approaches to cure food allergy e.g. immunotherapy (IT)
- EPIT – the peanut patch
- Current IT appears to desensitize but not tolerize
- Thus, patients need continuous exposure to tolerated doses of the allergenic food
- Food industry needs to develop specialized foods for this purpose
- Likelihood – desensitization (very near term); patches (1 year); tolerance (5-10 years minimum)

Nirvana – The Ideal Future

- Public health authorities accept risk-based approach to labeling and preventive allergen controls
- Accept thresholds (we have data on >2000 human subjects with food allergy; >1200 peanut-allergic)
- Accept that safe doses do exist (the one-shot studies prove that but first only published this month)
- Develop Reference Doses
- Use as basis for preventive allergen controls
- Likelihood: ????; will happen first outside of U.S.

Nirvana – The Ideal Future

- Labeling becomes truly risk based
- FALCPA offered excellent approach (plain English, Contains statement)
- But exemption aspect of FALCPA was flawed (the no protein standard = zero threshold)
- Thus some ingredients are labeled by source e.g. butter ester when they have no potential to elicit allergic reactions
- This can be solved with FDA development of Reference Doses for allergenic foods

Nirvana – The Ideal Future

- Recalls due to undeclared allergens decrease
- Food industry must fully adopt preventive allergen controls because most recalls due to errors
- Most common cause of recalls – putting incorrect product in the package
- But many products are recalled when the risk to allergic consumers is non-existent
- Another need for Reference Doses

Nirvana – The Ideal Future

- Reportable Food Registry is activated only when there is a genuine risk of an allergic reaction
- One of the most common causes of recalls is undeclared soy in bakery products
- Root cause is likely agricultural comingling of soy in wheat and wheat flour
- But agricultural comingling is “allowed” without labeling; Congress exempted raw agricultural commodities from FALCPA
- Does FDA agree?

Nirvana – The Ideal Future

- Food industry implements preventive allergen controls using quantitative risk assessment – risk-based approach
- Hazard identification and recognition of allergen load as a key factor
- Requires enhanced awareness of allergenic foods and inherent risks
- Industry must be able to select allergen test methods that are fit for purpose
- Allergen training at all levels of industry is pivotal: it is everyone's job

Nirvana – The Ideal Future

- Food industry determines economic impacts of allergen control
- Industry establishes corporate target levels even if FDA does not establish Reference Doses
- Industry adopts VITAL approach leading to curtailed use of precautionary labeling (risk-based)
- Improved sampling strategies are implemented
- Auditors/inspectors should also be well trained on food allergies, allergen analytical methods, and risk-based approaches to allergen control

Nirvana – The Ideal Future

- Allergen test methods become much more uniform and reliable
- Development and adoption of reference standards
- Uniform calibration units (ppm protein from the allergenic source!!)
- Development and implementation of improved extraction methods
- Use of naturally incurred standards
- Development of mass spectrometry as confirmatory tool

Summary

- We have made LOTS of progress
- Awareness of food allergies as a public health risk is at an all-time high among all stakeholders (consumers, industry, regulatory officials, clinicians, others)
- Packaged food products are safer than they have ever been for consumers with food allergies
- But the path to the Ideal Future will be long and potentially tortuous.

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