Tools for Prioritizing Food Safety Concerns

Report from Group 1

JIFSAN Workshop
June 4-6, 2007

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General Focus

• Chemical contaminants in foods
  – Organic anthropogenic
  – Natural toxins
  – Elementals
• Microbial pathogens (secondarily)
• Prioritization for resource allocation
Questions 1 & 5 –
Considerations that affect prioritization of food safety concerns

• Potential hazard
  – Severity/duration of effect
  – Reversibility
  – Other

• Exposure
  – Prevalence in diet
  – Levels in diet
  – Biomarkers of exposure

• Susceptible populations
Questions 1 & 5 –
Considerations that affect prioritization of food safety concerns (cont’d)

• Quality of available information
  – Confidence/uncertainty in prioritization

• Public perception
  – Chem/micro differences
  – Questions regarding conflicts of interest
  – Need for stakeholder involvement

• Requirement: sound scientific basis and transparency in prioritization process and evaluations
Questions 2 & 3 – Use of data in prioritization

- **Scenario** – unexpected contaminant in food
- **Analytical detection**
  - Identification → need for confirmation
  - Prevalence
    - Scope of contamination
    - Isolated incident?
    - Persistence? (in food supply)
  - Level(s) found
  - Where did it come from?
Questions 2 & 3 – Use of data in prioritization (cont’d)

• Exposure characterization
  – Estimate high-end exposures
  – Exposure distribution
  – Consider biomarker data (if available)
  – Biopersistent?
  – Possibility of extreme heterogeneity in samples (especially for microbial pathogens)

• Apply TTC as a pre-screen
  – Does exposure fall in “Minimal concern – lowest priority” category?
  – Note: Pre-screen also may be possible for some pathogens.
Questions 2 & 3 – Use of data in prioritization (cont’d)

- Beyond TTC, data requirements depend on level of concern based on:
  - Exposure (“infectivity” for microbes)
  - SAR
  - Tox endpoints
    - Severity/duration of effect (micro: “sequelae”)
    - Reversibility
    - Other
  - Sensitive populations
Questions 2 & 3 –
Use of data in prioritization (cont’d)

• Other factors
  – Public perception/culture
  – Intentionally added (e.g., terrorism)
  – Mitigation potential

• For some chemicals, may know a lot about hazard (acrylamide; some but not all heat-formed compounds); for others, may only have SAR.
Question 4 – Quantifying public health impacts of chemical risks

• Characterizing hazard/risk
  – Safety assessment → ADI, TDI, RfD; exceedence implies increasing risk potential – not quantification of risk.
  – Margin of exposure – compare NOAEL/BMD with human exposure
  – Cancer – (sometimes) estimate upper bound on risk (extrapolated) – for comparison of risks, not absolute risk quantification.

• Health metrics
  – QALY, DALY, p-DALY – proposed to be used to compare/integrate risks across chemical & microbial contaminants
Question 6 – Comparing hazards/risks: effect of type of data available

• Issues
  – For chemicals, almost always relying on extrapolation from animal data (or less) → much greater uncertainty in risk characterization than for microbial pathogens
  – Should we attempt quantitative estimate of human health impact at all, if we have only animal data?
  – Epidemiology data may be better but seldom available.
  – Prioritization based on qualitatively different kinds of data (e.g., epi vs. animal tox vs. in vitro vs. SAR) is likely to be less reliable.
Question 7 – Chemical risk prioritization framework: criteria for acceptability to all stakeholders

- Transparent
- Simple
- Sound scientific basis
  - Best available data
  - Conservative
- Well-documented
- Adaptable to incorporate advancing science
- Applicable to wide range of chemicals/pathogens and scenarios
Question 7 –
Chemical risk prioritization framework: criteria for acceptability to all stakeholders

- Engenders confidence that framework is health protective and in the best interest of the public
- Provides for stakeholder input
- Based on goal of effective resource allocation for protection of human health
Further Work

• Evaluate metrics for combined prioritization of chemicals and pathogens – p-DALY, other?
• Define process for further development of this prioritization framework
• Test and validate TTC pre-screen
• Continue exploration of approaches for rapid hazard screening (e.g., ToxCast)
• Increasing focus on exposure will require data on occurrence in foods.
Acknowledgments

Group 1
Mike Bolger
Bob Brackett
Henry Chin
John Doull
Susan Felter (at the keyboard)
John O’Brien
Steve Olin (facilitator)
Jo Anne Shatkin
Dan Skrypec
Deborah Smegal
Ewen Todd
Monique Turner