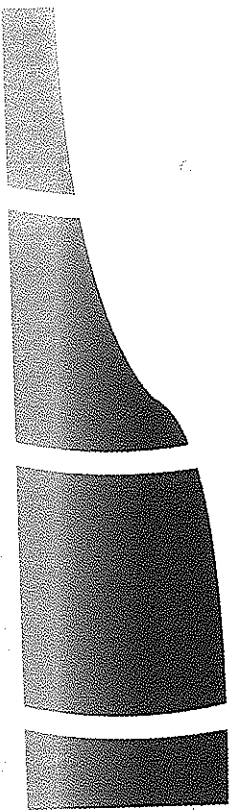
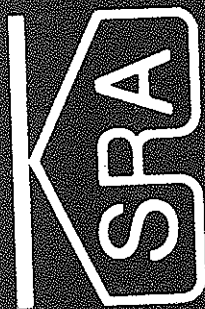


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T3.1 Felknor, S., Delclos, G., Morandi, M., Schulze, L.; The University of Texas Health Sciences Center, Houston; sfelknor@sph.uth.tmc.edu. CAPACITY BUILDING IN RISK ASSESSMENT IN LATIN AMERICA.

The Fogarty Center International Training in Research in Environmental and Occupational Health at the University of Texas (UT) School of Public Health includes a critical capacity building and research training component in risk assessment through a pilot research projects grant program. Annually, new investigators in collaborating institutions in Latin America are invited to submit pilot research projects in occupational and environmental health. These applications are externally reviewed for scientific merit and internally reviewed for programmatic relevance. Awards are made based on the availability of funds and merit, and project awards generally range between \$5,000 and \$10,000. Faculty from the UT Fogarty International Training program are assigned as co-investigators and mentor the Latin American principal investigators (PIs). PIs are required to present the results of their studies at an annual Fogarty program meeting or other scientific conference. To date, ten pilot projects have been funded in four collaborating countries of: Nicaragua, Costa Rica, Colombia and Venezuela in the areas of occupational and environmental health. These will be outlined and discussed.

T23.3 Fenner-Crisp, P.; ILSI Risk Science Institute, Washington DC; iwalls@ilsi.org. CHARACTERIZING CARCINOGENIC POTENTIAL.

Most carcinogenicity data are derived from human and long-term intact animal studies, along with a variety of shorter-term in vivo and/or in vitro studies. Sometimes a risk management decision has to be made to protect public health even though the carcinogenicity data may be incomplete for the chemicals involved. The use of the framework for assessing the carcinogenic potential of chemicals will be discussed in this presentation.

W20.1 Fenner-Crisp, PA.; ILSI Risk Science Institute; pfennercrisp@ilsi.org. EXPANDING THE MOA/HUMAN RELEVANCE FRAMEWORK.

A complete mode of action relevance analysis as distinct from mode of action analysis alone depends on robust information on the animal mode of action (MOA) as well as systematic comparison of the animal data with corresponding information from humans. In November, 2003, the International Life Sciences Institutes Risk Science Institute (ILSI RSI) published a two-year study using animal and human MOA information to generate a four-part Human Relevance Framework (HRF) for systematic and transparent analysis of MOA data and information. Based mainly on non-DNA reactive carcinogens, the HRF features a concordance analysis of key events in the MOA based on information from both animal and human sources, with a focus on determining the appropriate role for each MOA data set in human risk assessment. With MOA information increasingly available for risk assessment purposes, a new ILSI RSI report, sponsored by USEPA and Health Canada, demonstrates the further applicability of the HRF for reproductive, developmental, neurologic, and renal endpoints, as well as the HRFs contribution to ongoing efforts to harmonize risk assessment principles and practices. Based on qualitative and quantitative MOA considerations, MOA/human relevance analysis contributes to identifying data needs and issues essential for the dose-response and exposure assessment components of the overall risk assessment.

W14.1 Ferson S., Tucker W.T.; Applied Biomathematics; scott@ramas.com. SOLVING UNCERTAIN EQUATIONS: BACKCALCULATING, UPDATING AND DECONVOLVING.

There are multiple ways to solve an equation when its variables are uncertain. For instance, if a random measurement Y is the sum of a randomly fluctuating true value X and an independent measurement error e , then probabilistic deconvolution can be used to estimate the distribution of X from the distributions for Y and e by untangling the equation $Y = X + e$. Updating is a related operation used to improve the estimates of one or multiple quantities based on information about the relationship between them. For instance, separate estimates of the area A , length L , and width W of a rectangle can be considered against their relationship $A = L * W$ to obtain the best possible estimates that are mutually consistent. Backcalculation is another operation used in problems such as estimating the allowable range of contaminant concentrations C that will ensure a tolerable range of doses D under a prevailing range of intake rates I in a population of exposed individuals. Backcalculation solves the equation $D = C * I$

, but in a way that is decidedly different from either deconvolution or updating. We discuss the connections between these outwardly dissimilar operations and show how the calculations can be understood in a general context. Examples of each arise in both interval analysis and probability theory. We show that the unification of these two theories in the context of probability bounds analysis (or, more generally, imprecise probabilities) reveals the inter-relatedness of the operations. They can be seen as examples of solutions to a general problem and are distinguished by the nature of the uncertainty involved, the dependence among the operands, and the goal of the calculation. We also show how the solutions obtained under the more general theory of uncertainty sometimes make more sense and are more useful than the solutions obtained within the strictures of either more narrow theory.

M23.1 Finkel A.M.; US Occupational Safety and Health Administration; finkel.adam@dol.gov. EPA'S 2004 RISK ASSESSMENT MANIFESTO: A CRITICAL ANALYSIS OF A FORTHRIGHT DOCUMENT.

EPA's recent staff paper ("An Examination of EPA Risk Assessment Principles and Practices") provides a clearer statement of the Agency's risk assessment protocols, philosophy, and future directions than the perpetual motion apparatus that continues to struggle with the Guidelines for Carcinogen Risk Assessment. As such, it allows for a straightforward analysis of its conclusions that does not hinge on the observers intuition, wishful or otherwise, about what the Agency actually intends. I will examine this document using the two seminal National Academy of Sciences reports (the 1983 Red Book and the 1994 Blue Book) as a starting point, focusing on key issues the NAS committees identified such as: (1) default models and the evidentiary standard for replacing them with new information; (2) uncertainty in exposure and potency; and (3) human variation in susceptibility to carcinogenesis. I will also discuss early reactions to the document from stakeholders, especially the allegation that EPA has developed a stance that is not policy-neutral, which I interpret as disappointment that the Agency has not adopted wholesale a set of profoundly policy-laden alternatives advocated by its critics (personal views only, not those of the U.S. government).

P3.21 Finkel A.M.; US Occupational Safety and Health Administration; finkel.adam@dol.gov. THE RISK OF OCCUPATIONAL FATALITIES UNANTICIPATED BY REGULATION OR CODES OF PRACTICE.

A three-part series (December 2003) on OSHA in the New York Times highlighted the Agency's long-standing reluctance to pursue criminal penalties against companies who willfully place employees in grave danger. Various legislators have introduced proposals to increase the severity of such penalties if issued, and to increase OSHA's interest in the possible deterrent value of zealous criminal enforcement. Such measures, however, are essentially reactive and do not directly reduce the probability that a given workplace tragedy will repeat itself especially in cases where the fatality was caused wholly or predominantly by factors other than non-compliance with regulations or recognized codes of practice. I will analyze several years of case reports of fatalities inspected by OSHA, in order to: (1) estimate the proportion of fatalities that occur because of product defect or design issues, or other factors that lie outside the existing (or reasonably plausible) scope of federal and state regulatory requirements; and (2) identify specific circumstances that have resulted in a pattern of fatalities, and where targeted educational and other outreach efforts might break this pattern. Based on this analysis, I will recommend process improvements whereby OSHA, NIOSH, and the state OSHA plans could share information and develop coordinated responses to fatalities that will likely recur absent some effort to inform employers and workers of unrecognized or unappreciated hazards (personal views only, not those of the U.S. government).

T6.2 Finley B.L., Richter R.O., Mowat E.S., Mlynarek S., Paustenbach D.J., Warner J.L., Sheehan P.J.; Exponent Santa Rosa, CA, Irvine, CA, Menlo Park, CA, Oakland, CA, University of South Florida, ChemRisk; fmowat@exponent.com. CUMULATIVE OCCUPATIONAL ASBESTOS EXPOSURES OF U.S. BRAKE REPAIR MECHANICS.

Over the past 35 years, the National Institute of Occupational Safety and Health, automobile industries, private researchers, and others have collected air samples in garages to evaluate brake mechanic exposures to asbestos. To date there have been no attempts to develop cumulative exposure estimates from these data. This paper provides

an analysis of cumulative occupational exposures of U.S. brake mechanics working in the 1960s through 1990s. Analyses included (1) mechanics working on passenger vehicles and light trucks in commercial garages, where several brake jobs were done weekly, and (2) those working in service station garages where fewer brake jobs were done weekly. Probabilistic (Monte Carlo) methods and various distribution models were used to calculate cumulative exposures from distributions of 8-hour time-weighted average (TWA) exposure concentrations for brake mechanics and distributions of job tenure data (total years worked as a mechanic). The median estimated cumulative occupational exposure for U.S. automobile brake mechanics working in garages with no dust control measures ranged from 0.20 to 0.57 fibers per cubic centimeter-year (f/cc*year), and from 0.01 to 0.02 f/cc*year for mechanics in garages with dust control measures. Service station attendants had median cumulative exposures that ranged from 0.06 to 0.07 f/cc*year. Estimated cumulative occupational exposures for U.S. brake mechanics are consistent with, but generally lower than, those reported for European brake mechanics. The estimated exposures are all significantly lower than the theoretical lifetime exposure (4.5 f/cc*year) for 45 years of exposure at the present Occupational Safety and Health Administration Permissible Exposure Limit of 0.1 f/cc. Cumulative occupational exposures for U.S. brake mechanics indicate that mechanics are exposed to between approximately one-hundredth and one-thousandth that of other occupational groups that handled raw asbestos or asbestos products.

T9.4 Finucane M.L., Satterfield T., Roberts M., Henare M., Henare M.; Kaiser Permanente Hawaii Center for Health Research; University of British Columbia; Wananga o Awanui a Rangī; Auckland University; University of Cambridge; Melissa.L.Finucane@kp.org. MĀORI PERSPECTIVES ON THE RELATIVE IMPORTANCE OF TANGIBLE AND INTANGIBLE DIMENSIONS OF DIFFERENT TYPES OF GMO APPLICATIONS: AN EMPIRICAL STUDY.

This paper describes an empirical study of how tangible and intangible values are weighed by diverse groups of Māori people in decisions about the acceptability of genetically modified organisms (GMOs). Using the method of paired comparisons, we presented study participants with several pairs of GMO application scenarios; each scenario was articulated in reference to multiple value dimensions. Participants indicated which scenario in each pair was more acceptable. Overall, analyses showed that four dimensions (gene origin, purpose, who benefits, and mauri interference) were relatively most important in acceptability judgments; three dimensions (product type, location of research, and who controls the patent) were relatively moderately important; and two dimensions (type of species modified and type of environmental benefit) were relatively least important. Other results indicated that most GMO applications that were presented tended to be seen as risky and unacceptable and that decision making about GMOs should follow informed and thorough processes. The findings are novel in that they more clearly delineate socio-cultural values as key determinants of evaluative decision making in a risk context. The findings are, also, consistent with previous research where socio-cultural variables are said to determine sensitivity to potential stigmatization and the importance of trust in decision makers. We discuss the implications of the results for developing a systematic decision framework that adequately incorporates Māori concerns. Such a decision framework would facilitate the integration of tangible and intangible dimensions of decisions about GMO applications, bringing Māori and non-Māori towards closer agreement on which GMO applications should be approved in New Zealand and under what conditions. The framework will serve as an alternative to existing decision processes that favor more scientific, economic, or other quantitative dimensions.

P3.20 Fischer A.R.H., de Jong A.E.I., Frewer L.J., Nauta M.J., de Jonge R.; Wageningen University Marketing and Consumer Behaviour Group and RIVM (National Institute for Public Health and the Environment); amout.fischer@wur.nl. A TRANSDISCIPLINARY STUDY OF CONSUMER BELIEFS, BEHAVIOR AND MICROBIAL CONTAMINATION IN PREPARING A MEAL.

The prevention of consumer food poisoning is an important issue from the point of view of public health. For this purpose, information interventions targeted at the behavior of consumers during food preparation are an essential part of developing an effective intervention strategy. However results from psychological research have shown that the development of effective intervention strategies is problematic, and indicate that consumers do not

readily adopt safe food preparation practices. To be successful in communication relevant risk information, targeted campaigns should be developed in which technical risk assessments and risk perception/communication are integrated. To achieve this, close cooperation between, microbiologists and risk psychologists is required. The primary aim of the research is to explore and try to understand the relations between consumer practices, the resulting microbial contamination, and their risk perceptions regarding current food preparation practices. A study will be reported in which these relations were explored by asking Dutch consumers to prepare a chicken salad in their own kitchen. Cross-contamination during food preparation was microbiologically followed by contaminating raw chicken with a harmless tracer, as a substitute for *Campylobacter*. Participants were then interviewed to explore their beliefs with regard to food and food safety. By analyzing videotapes of the food preparation, the microbial contamination of the finished meal, and the interview texts, the relations between behavior and microbial effects and between food related beliefs and behavior are explored, which leads to identification of actual hazards and increased understanding of the relation between behavior and beliefs of consumers. Results and conclusions of this study will be presented, together with implications for future research.

M18.6 Florig H.K., Xu J.H.; Carnegie Mellon University; florig@cmu.edu. COMBINING EXPERT KNOWLEDGE AND LAY VALUES IN CHINA: A CROSS-CULTURAL TEST OF THE CMU RISK RANKING METHOD.

Past research at Carnegie Mellon University (CMU) has demonstrated a method for combining technical expertise and lay values in a process for ranking risks to health, safety, and environment. Although the CMU method has been shown to work well with U.S. subjects, its viability in other cultural settings is still being assessed. To explore this cross-cultural dimension, we tested the CMU risk-ranking protocol among ethnic Chinese. We choose Chinese subjects because previous cross-cultural research has shown that Chinese differ from westerners along several dimensions of personality, interpersonal relations, cognition, and values that might influence risk ranking. Five groups of 8-10 Chinese adults were assembled for this study. Prior to meeting in their respective groups, each participant studied written materials (in Chinese) on 10 environmental risks in Beijing (e.g., air pollution from coal burning). Each participant then ranked these risks both holistically and using a multiattribute procedure involving 20 risk characteristics describing human and ecological impacts. In a subsequent audio-recorded group session, participants deliberated to produce holistic and multiattribute group rankings. Following the group session, individual rankings were again elicited to assess the impact of the group discussions on individuals views. Finally, participants were asked to report their level of satisfaction with their groups decision-making process and asked to indicate how strongly they would approve or disapprove of using the results of their ranking session as an input to risk-management decisions by government officials in Beijing. Data analysis explores (i) the extent to which Chinese participants are swayed by the opinions of their group and of senior group members, (ii) differences in attribute weights assigned by Chinese and by American participants of previous experiments, and (iii) the acceptability of the CMU process as judged by Chinese participants.

T8.3 Flowers L., Benedict J., Gehlhaus M.; US Environmental Protection Agency, ORD, NCEA; flowers.lynn@epa.gov. U.S. EPAS INTEGRATED RISK INFORMATION SYSTEM (IRIS) PROGRAM HEALTH ASSESSMENT FOR POLYCYCLIC AROMATIC HYDROCARBON (PAH) MIXTURES.

The IRIS Program is undertaking a health assessment for PAH mixtures. PAHs are ubiquitous environmental contaminants. A number of assessments for individual PAHs exist, but do not consider the environmental occurrence of PAHs as complex mixtures. The PAH mixtures assessment will include three approaches for assessment of health risks of chemical mixtures and is based on the Guidance for the Health Risk Assessment of Chemical Mixtures (U.S. EPA, 1986) and the Supplemental Guidance for Conducting Health Risk Assessment of Chemical Mixtures (U.S. EPA, 2000). The assessment will also reflect the recommendations of the Peer Consultation Workshop on Approaches to PAH Health Assessment (U.S. EPA, 2002). Procedures defined by these documents consider data on either the mixture of concern, data on toxicologically similar mixtures, or data on the mixtures component chemicals. For example, the surrogate approach estimates the potency of the PAH fraction of a mixture of concern, based