ILSI North America

# Food Safety Briefs

April 2017

## Caffeine

### Caffeine, Coffee, and Appetite Control: A Review

Schubert MM, Irwin C, Seay RF, Clarke HE, Allegro D, Desbrow B. *Int J Food Sci Nutr*. 2017 Apr 27:1–12. doi: 10.1080/09637486.2017.1320537. Article Link

**Significance:** Evidence regarding the influence of caffeine and coffee on gastric emptying, appetite hormones, and appetite perceptions was equivocal. The influence of covariates such as genetics of caffeine metabolism and bitter taste phenotype remain unknown; longer controlled studies are needed.

Coffee and caffeine consumption has global popularity. However, evidence for the potential of these dietary constituents to influence energy intake, gut physiology, and appetite perceptions remains unclear. The purpose of this review was to examine the evidence regarding coffee and caffeine's influence on energy intake and appetite control. The literature was examined for studies that assessed the effects of caffeine and coffee on energy intake, gastric emptying, appetite-related hormones, and perceptual measures of appetite. The literature review indicated that coffee administered 3-4.5 h before a meal had minimal influence on food and macronutrient intake, while caffeine ingested 0.5-4 h before a meal may suppress acute energy intake.

## Methodology

### A Primer on Systematic Reviews in Toxicology

Hoffmann S, de Vries RBM, Stephens ML, Beck NB, Dirven HAAM, Fowle JR, et al. *Arch Toxicol*. 2017 May 13 [Epub ahead of print]. doi: 10.1007/s00204-017-1980-3. Article Link

**Significance:** This is intended to stimulate scientific discussions of the identified issues to fuel the development of toxicology-specific methodology and to encourage the application of systematic review methodology to toxicological issues

Systematic reviews, pioneered in the clinical field, provide a transparent, methodologically rigorous and reproducible means of summarizing the available evidence on a precisely framed research question. Having matured to a well-established approach in many research fields, systematic reviews are receiving increasing attention as a potential tool for answering toxicological questions. In the larger framework of evidence-based toxicology, the advantages and obstacles of, as well as the approaches for, adapting and adopting systematic reviews to toxicology are still being explored. To provide the toxicology community with a starting point for conducting or understanding systematic reviews, we herein summarized available guidance documents from various fields of application. The authors have elaborated on the systematic review process by breaking it down into ten steps, starting with planning the project, framing the question, and writing and publishing the protocol, and concluding with interpretation and reporting. In addition, we have identified the specific methodological challenges of toxicological questions and have summarized how these can be addressed. Ultimately, this primer is intended to stimulate scientific discussions of the identified issues to fuel the development of toxicology-specific methodology and to encourage the application of systematic review methodology to toxicological issues.

## Packaging

### Evaluation of Short-Term and Long-Term Migration Testing From Can Coatings Into Food Simulants: Epoxy and Acrylic–Phenolic Coatings

Paseiro-Cerrato R, DeVries J, Begley TH. *J Agric Food Chem*. 2017 Mar 29;65(12):2594–2602. doi: 10.1021/acs.jafc.7b00081. Article Link

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**Significance:** These results suggest that migration protocols should be modified to account for long-term storage.

Traditionally, migration testing during 10 days at 40 °C has been considered sufficient and appropriate for simulating the potential migration of substances from food-contact materials into foods. However, some packages, such as food cans, may be stored holding food for extended time periods (years). This study attempts to verify whether common testing conditions accurately estimate long-term migration. Two types of can coatings, epoxy and acrylic-phenolic, were subjected to short-term and long-term migration testing (1 day-1.5 years) using food simulants (water, 3% acetic acid, 50% ethanol, and isooctane) at 40 °C. Using HPLC-DAD/CAD, HPLC-MS, UHPLC-HRMS (where HRMS is accurate mass, mass spectrometry), and DART-HRMS, researchers identified potential migrants before starting the experiment: BPA, BADGE, BADGE derivatives, benzoguanamine, and other relevant marker compounds. During the experiment using a water-based food simulant, migrants remained stable. Most of the cans in contact with 3% acetic acid did not survive the experimental conditions. Tracked migrants were not detected in isooctane. In the presence of 50% ethanol, the traditional migration test during 10 days at 40 °C did not predict migration during long-term storage.

## All Natural and Clean-Label Preservatives and Antimicrobial Agents Used During Poultry Processing and Packaging

Grant A, Parveen S. *J Food Prot.* 2017 Apr;80(4):540–544. doi: 10.4315/0362-028X.JFP-16-146. Article Link

**Significance:** This review provides a brief glance at the potential natural antimicrobial agents have in terms of reduced pathogenicity, increased shelf stability, and sensory acceptability through direct product application or as part of the product packaging.

The poultry industry is faced with compounding pressures of maintaining product safety and wholesomeness while keeping up with consumer trends of all-natural foods and label accuracy. Consumers are increasingly demanding that their foods be minimally processed and contain compounds that are easily read and recognized, i.e., products must be clean labeled. The purpose of this review is to briefly describe several natural antimicrobial agents that can be incorporated into poultry processing. These compounds and their essential oils were included in this mini-review because they are generally recognized as safe by the U.S. Food and Drug Administration and are considered clean label: thyme extract, rosemary extract, garlic, and oregano. This list of natural antimicrobial agents by no means includes all of the options available to poultry processors.

## (Q)SAR Tools for Priority Setting: A Case Study With Printed Paper and Board Food Contact Material Substances

Van Bossuyt M, Van Hoeck E, Raitano G, Manganelli S, Braeken E, Ates G, Vanhaecke T, Van Miert S, Benfenati E, Mertens B, Rogiers V. *Food Chem Toxicol.* 2017 Apr;102:109–119. doi: 10.1016/j.fct.2017.02.002. Article Link

**Significance:** A new prioritization strategy for identifying potentially mutagenic substances was developed based on the combination of multiple (quantitative) structure-activity relationship ((Q)SAR) tools. The strategy developed here can be applied to other groups of chemicals facing the same need for priority ranking.

Over the last years, more stringent safety requirements for an increasing number of chemicals across many regulatory fields (e.g. industrial chemicals, pharmaceuticals, food, cosmetics, …) have triggered the need for an efficient screening strategy to prioritize the substances of highest concern. In this context, alternative methods such as in silico (i.e. computational) techniques gain more and more importance. In the current study, a new prioritization strategy for identifying potentially mutagenic substances was developed based on the combination of multiple (quantitative) structure-activity relationship ((Q)SAR) tools. Non-evaluated substances used in printed paper and board food contact materials (FCM) were selected for a case study. By applying our strategy, 106 out of the 1723 substances were assigned 'high priority' as they were predicted mutagenic by 4 different (Q)SAR models. Information provided within the models allowed to identify 53 substances for which Ames mutagenicity prediction already has in vitro Ames test results. For further prioritization, additional support could be obtained by applying local i.e. specific models, as demonstrated here for aromatic azo compounds, typically found in printed paper and board FCM.

## Weight of the Evidence Assessment

### Hypothesis-Driven Weight-of-Evidence Analysis of Endocrine Disruption Potential: A Case Study With Triclosan

Mihaich E, Capdevielle M, Urbach-Ross D, Slezak B. *Crit Rev Toxicol*. 2017 Apr;47(4):263–285. doi: 10.1080/10408444.2016.1269722. Article Link

**Significance:** This systematic and transparent WoE assessment indicated that triclosan is not acting as an agonist or antagonist within the estrogen, androgen, thyroid, or steroidogenic pathways and is not impacting endocrine pathways as a lead or primary mode of toxicity.

Triclosan is an antimicrobial agent used in a range of consumer products, such as deodorants, oral care, clothing, and household items. As with many consumer products, triclosan can be rinsed down the drain and transported to wastewater treatment plants. While most is eliminated during activated sludge sewage treatment by biodegradation and adsorption, some triclosan enters the aquatic environment and may expose wildlife. Given the potential for exposure to both humans and wildlife, resolving whether triclosan is endocrine active is important due to growing concerns about potential adverse public health and environmental effects of endocrine-disrupting substances. A weight of evidence (WoE) analysis focusing on specific hypotheses related to interaction with estrogen, androgen, and thyroid hormone pathways, and steroidogenesis was applied to triclosan. This WoE procedure involved systematic consideration of each endpoint, focused on screening level studies in the US Endocrine Disruptor Screening Program, as well as those in levels 1 through 5 of the OECD Conceptual Framework. This was followed by a semiquantitative relevance weighting of each endpoint to a given hypothesis to reach scientifically justified conclusions. Use of all relevant and reliable information and consistent observations in multiple studies strengthen support for or against each mode of action hypothesis.

## Scientific Integrity

### Conflict of Interest and the Role of the Food Industry in Nutrition Research

Mozaffarian D. *JAMA*. 2017 May 2;317(17):1755–1756. doi: 10.1001/jama.2017.3456. Article Link

**Significance:** Given the scale of nutritional challenges worldwide, the scope of industry's expertise and reach, the diversity across companies and their employees, and the potential to create products that are healthier and more profitable, the food industry is a necessary partner for important research and translational solutions to help address the global nutrition crisis.

### Fostering Research Integrity

National Academies of Science, Engineering, and Medicine. *Fostering Research Integrity.* Washington, DC: National Academies Press; 2017. Report Link

**Significance:** The integrity of knowledge that emerges from research is based on individual and collective adherence to core values of objectivity, honesty, openness, fairness, accountability, and stewardship. Integrity in science means that the organizations in which research is conducted encourage those involved to exemplify these values in every step of the research process. Understanding the dynamics that support – or distort – practices that uphold the integrity of research by all participants ensures that the research enterprise advances knowledge.

### Research Integrity—Have We Made Progress?

*The Lancet*. 2017;389(10081):1771. doi: 10.1016/S0140-6736(17)31201-1. Article Link

**Significance:** The ILSI North America efforts related to Scientific Integrity will be presented at the upcoming World Congress on Research Integrity. This editorial briefly describes the current landscape of research integrity initiatives and progress in the scientific community.