Seneca Fitch

SENIOR SCIENTIST
INFORMATION SPECIALIST

CONTACT INFORMATION

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PROFESSIONAL PROFILE

Ms. Seneca Fitch is an information specialist who regularly supports systematic evaluations of consumer products, food ingredients and additives, pharmaceuticals, and industrial chemicals. She has particular expertise in developing database-specific syntax and implementing search strategies for investigational and systematic literature searches in citation databases such as PubMed, Embase, and ToxPlanet. This work consists of formulating search strings according to structured and controlled vocabulary, such as PubMed's MeSH and Embase's Emtree, using Boolean search phrases, and running reference management software (e.g., DistillerSR) to organize and deliver query results. Additionally, Ms. Fitch has practical knowledge of the start-to-finish process of a systematic review according to several frameworks. Her expertise includes protocol development, definition of inclusion and exclusion criteria and data extraction parameters, critical appraisal of relevance and study quality, and creation of evidence tables and data visualizations. Recently, she has applied the principals of systematic review to the evaluation of endocrine potential in compounds using guidance such as the European Chemicals Agency's (ECHA's) 2018 guidance for the identification of endocrine disruptors. These efforts include developing a strategy to gather and assess all relevant information, assemble lines of evidence, and analyze the data set for estrogen, androgen, thyroid, or steroidogenesis-related endocrine activity.

In an extension of the systematic evaluation arena, Ms. Fitch developed and maintains several internal and external tools that consult a wide range of sources to combine data and assist in managing the scientific landscape—a capability that allows for efficient and timely summarizing of large amounts of information in qualitative and quantitative capacities. These databases include guidance levels developed for food additives by several regulatory agencies (e.g., Acceptable Daily Intakes [ADIs]), regulatory status of such additives, and results of toxicity and carcinogenicity studies for more than 1,800 chemical exposure studies.

In addition to her skills in systematic review and literature identification, Ms. Fitch also has experience in conducting hazard assessments for a range of products, including herbal and natural products, essential oils, food additives, and microorganisms. This includes identification of toxicological data, as well as integration of regulatory considerations from US and international agencies to ensure a comprehensive overview of the product. She has also collaborated in determining appropriate receptor locations for air dispersion modeling of chemical releases to characterize chemical concentrations present in residential, occupational, and sensitive populations. The resulting data sets were used to perform a preliminary health hazard screening and risk assessment of the possible exposure scenarios. Ms. Fitch has a strong working knowledge of health-based environmental toxicological values from federal human health assessment programs, such as ADIs, reference concentrations (RfCs), reference doses (RfDs), and maximum residue levels (MRLs), as well as emergency exposure guideline levels (e.g., acute exposure guideline levels [AEGLs], emergency response planning guidelines [ERPGs], and temporary emergency exposure limits [TEELs]).

EDUCATION AND DEGREES EARNED

2012 Texas Tech University, B.S., Biology

PROFESSIONAL ASSOCIATIONS

2017–Present Evidence Based Toxicology Collaboration
Tox21 Working Group Member

2015–Present Air & Waste Management Association
Young Professionals Coordinator (2016, 2017)
Hot Air Topics Conference Planning Committee (2016)
Annual Conference and Exhibition Planning Committee (2017)

PROFESSIONAL EXPERIENCE

Contributed to the development of multiple systematic review protocols, and their implementation, for a range of compounds (e.g., caffeine, TCE) across evidence streams (human, experimental animal, mechanistic). This included specific considerations such as establishing topic-specific search strategies, designating inclusion and exclusion criteria, study screening and characterization, and risk-of-bias assessment (e.g., internal validity). Protocols were developed according the PROSPERO registration requirements to increase transparency and reduce bias in performing systematic reviews.

Developed a database to record and track ADI development by EFSA, JECFA, and FDA, and benchmark values used to develop them. As a secondary initiative, subjective information, such as public opinion on the danger of such compounds, is also captured to provide a snapshot of the current landscape.

Assisted in developing and implementing a search strategy to capture mechanistic data related to four common low-/no-calorie sweeteners. Data were then reviewed for relevance and extracted systematically, and an algorithm was applied to estimate carcinogenic potential relative to the ten key characteristics of carcinogens, as described by Smith et al. (2016).

Formulated and conducted a systematic literature search to identify peer-reviewed literature pertaining to the carcinogenicity of a commonly used flame retardant. Screened literature by title and abstract and later organized results according to a framework set forth by IARC.

Regularly creates and pilots detailed forms via DistillierSR, a proprietary software, according to the needs of title and abstract screening, full-text screening, data extraction, risk-of-bias, or full systematic review.

Evaluated potential endocrine disruption activity in humans of an organophosphorus flame retardant and its degradants by integrating *in vivo* studies and *in vitro* high-throughput screening data relative to the exposure required to elicit the potential responses.

Applied ECHA's 2018 guidance on evaluating endocrine disruptors to data sets for a variety of flame-retardants. The evaluations focused on identifying potential for activity along the estrogen, androgen, thyroid, and steroidogenesis pathways following exposure to these compounds, as well as any degradation products or metabolites.

Reviewed and extracted data from more than 600 publications to produce an index of data sets from *in vivo* and *in vitro* assays assessing the genotoxicity of 2-AAF, acrylamide, aflatoxin B_1, benzo(a)pyrene, butadiene, doxorubicin, MeIQx, PhIP, and vinyl chloride.

Assisted in the completion of non-clinical pharmacology, pharmacokinetics, and toxicology sections of a successful Investigational New Drug (IND) application filing.

Fit mathematical models to dose-response data using EPA's Benchmark Dose software to identify the benchmark dose level (BMDL) of a common flame retardant synergist.

Developed monographs for flavor additives and essential oils to identify relevant toxicology information and knowledge gaps for use in a large-scale systematic review of tobacco additives. Monographs included a review of available information, including physical and chemical properties, regulatory considerations, toxicological data, pyrolysis, and thermal degradation.

Wrote toxicology monographs identifying potential hazards of impurities and excipients at an anticipated exposure in patients for a pharmaceutical drug formulation. Assessments included physiochemical properties, regulated uses and limits, pharmacology, toxicology, immunology, pharmacokinetics, and in some cases, derivation of the toxicology-based exposure limit. Monographs were used to assess toxicity and formulate recommendations for necessary nonclinical studies.

Supported the update of an existing Superfund risk assessment using the EPA Risk Assessment Guidance for Superfund: Part D (RAGS D) tables to reflect potential new site usage.

Prepared a screening human health risk evaluation for indoor air measurements to assess the possibility of vapor intrusion of volatile organic compounds (VOCs) in subsurface soils adjacent to the property, and the potential public health risk of the current building and occupancy conditions. The data evaluation included comparison of indoor air concentrations to health-based screening levels and assessment of potential lifetime excess cancer risk and non-cancer hazard index of measured concentrations.

Formulated questions for a deposition pertaining to a potential occupational exposure to propane. Relevant questions were formed by an initial hazard characterization of propane, as well as site-specific information regarding the potential source of emission.

Calculated descriptive statistics of TBBPA and TBBPA-conjugate concentrations using GraphPad Prism to support analysis of the dose- and time-dependent changes of tissue levels in a repeat-dose toxicokinetic study.

Used the EPA IEUBK model to determine risk associated with soil concentrations of lead on a Superfund site in Pennsylvania for baseline and future/potential land-use scenarios.

Collaborated in the development of a quantitative framework to evaluate the ten key characteristics of carcinogens, as described by Smith et al. (2016).

Assisted in the development of a systematic review protocol and specific considerations, such as assessment of individual study risk of bias, or internal validity, as well as strength of evidence.

Completed the analysis of multiple chemicals within Sciome's SWIFT-Review, to understand the efficiency at which the software organized and tagged the literature within specified toxicological categories.

Conducted hazard assessments of natural products (e.g., chili peppers, marigold, etc.) intended for use in dietary supplements and other nutritional products. Assessments included review of traditional and current use, toxicological data, and various regulatory considerations from both US and international agencies.

Developed a chemical database for ToxStrategies that mines web data from more than 1,800 chemical exposure studies, facilitating trend analysis of continually accumulating intelligence pertaining to toxicity and carcinogenicity studies.

Assisted in generating receptor locations for air dispersion modeling of a chemical release, to obtain a data set that is sensitive to several possible exposure scenarios. Used this data set to compare identified air concentration limits, as well as values developed according to state guidance in a preliminary screening. Current emergency exposure limits were also evaluated in reference to the event in a preliminary health hazard assessment of the release.

Selected and compared defined Metropolitan Statistical Areas in the United States using data provided by the U.S. Census Bureau, to determine comparable cities based on similar demography and industrial workforce. These selected areas were used in an analysis of background health outcome levels to determine whether asthma and cancer rates are elevated among the cities of comparison.

Evaluated the geographic location of sediment samples along a shoreline with recreational access and assisted in identifying future sampling locations, to ensure an adequate amount of data to support future calculation of possible risks to visitors of the recreational sites.

Assisted in specifying inclusion and exclusion criteria for literature indexed in a database to identify studies that assessed the effect of Cr(VI) on relevant genotoxic endpoints to support the development of comments submitted to a regulatory agency.

MANUSCRIPTS

Fitch SE, Payne LE, van de Ligt JLG, Doepker C, Handu D, Cohen SM, Anyangwe N, Wikoff D. 2021. Use of acceptable daily intake (ADI) as a health-based benchmark in nutrition research studies that consider the safety of low-calorie sweeteners (LCS): A systematic map. BMC Public Health 21(1):956, doi: 10.1186/s12889-021-10934¬2.

Borghoff SJ, **Fitch SE**, Black MVB, McMullen PD, Andersen ME, Chappell GA. 2021. A systematic approach to evaluate plausible modes of [action] for mouse lung tumors in mice exposed to 4-methylimidozole. Regul Toxicol Pharmacol 124:104977; DOI: 10.1016/j.yrtph.2021.104977.

Dirven H, Vist GE, Bandhakavi S, Mehta J, **Fitch SE**, Pound P, Ram R, Kincaid B, Leenaars CHC, Chen M, Wright RA, Tsaioun K. 2021. Performance of preclinical models in predicting drug-induced liver injury in humans: A systematic review. Nature, Scientific Reports; open access: https://doi.org/10.1038/s41598-021-85708-2.

Thompson CM, Gentry R, **Fitch S**, Lu K, Clewell HJ. 2020. An updated mode of action and human relevance framework evaluation for formaldehyde-related nasal tumors. Crit Rev Toxicol 50(10):919–952, https://doi.org/10.1080/10408444.2020.1854679.

Wikoff DS, Urban JD, Ring C, Britt J, **Fitch S**, Haws LC. 2020. Development of a range of plausible non-cancer toxicity values for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) based on effects on sperm count: Application of systematic review methods and quantitative integration of dose response using meta-regression. Toxicol Sci 179(2):162-182, https://doi.org/10.1093/toxsci/kfaa171.

Wikoff DS, Chappell GA, **Fitch S**, Doepker CL, Borghoff SJ. 2019. Lack of potential carcinogenicity for aspartame – Systematic evaluation and integration of mechanistic data into the totality of the evidence. Food Chem Toxicol 135:110866 [open access], https://doi.org/10.1016/j.fct.2019.110866.

Thompson CM, **Fitch SE**, Ring C, Rish W, Cullen JM, Haws LC. 2019. Development of an oral reference dose for the perfluorinated compound GenX. J Appl Toxicol, open access: https://onlinelibrary.wiley.com/doi/full/10.1002/jat.3812.

Thompson CM, Kirman CR, Hays SM, Suh M, **Harvey SE**, Proctor DM, Rager JE, Haws LC, Harris MA. 2018. Integration of mechanistic and pharmacokinetic information to derive oral reference dose and margin-of-exposure values for hexavalent chromium. J Appl Toxicol 38:351–365. doi: 10.1002/jat.3545.

Suh M, Wikoff D, Lipworth L, Goodman M, **Fitch S**, Mittal L, Ring C, Proctor D. 2019. Hexavalent chromium and stomach cancer: A systematic review and meta-analysis. Crit Rev Toxicol [ePub ahead of print]: doi: 10.1080/10408444.2019.1578730.

Urban J, Wikoff D, Haws L, **Fitch S**, Ring C, Thompson C, Suh M. 2018. Systematic review protocol: Systematic review and meta-regression to characterize the dose-response relationship between exposure to dioxin-like compounds during sensitive windows of development and reduced sperm count. Zenodo. http://doi.org/10.5281/zenodo.1636357.

Wikoff DS, Rager JE, Chappell GA, **Fitch S**, Haws L, Borghoff SJ. 2018. A framework for systematic evaluation and quantitative integration of mechanistic data in assessments of potential human carcinogens. Toxicol Sci 167(2):322–335, https://doi.org/10.1093/toxsci/kfy279.

Borghoff SJ, **Fitch S**, Rager JE, Huggett D. 2018. A hypothesis-driven weight-of-evidence analysis to evaluate potential endocrine activity of perfluorohexanoic acid. Regul Toxicol Pharmacol 99:168–181.

Wikoff DS, Thompson C, Rager J, Chappell G, **Fitch S**, Doepker C. 2018. Benefit-risk analysis for foods (BRAFO): Evaluation of exposure to dietary nitrates. Food Chem Toxicol (in press). https://doi.org/10.1016/j.fct.2018.08.031.

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Borghoff SJ, Wikoff D, **Harvey S**, Haws L. 2016. Dose- and time-dependent changes in tissue levels of tetrabromobisphenol A (TBBPA) and its sulfate and glucuronide conjugates following repeated administration to female Wistar Han rats. Toxicol Rep 3:190–201.

ABSTRACTS AND PRESENTATIONS

Ring C, **Fitch S**, Haws L, Harris M, Wikoff D. Quantitative integration of dose-response data for relative potency estimates of dioxin-like chemicals. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3385.

Borghoff S, **Fitch S**, Britt J, Franke K, Wikoff D. Application of the EFSA/ECHA endocrine disruption guidance as a framework for evidence integration in a weight-of-evidence (WoE) analysis for oxybenzone (BP-3). Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine, Washington, DC, June 2019.

Urban J, Wikoff D, Suh M, Britt J, **Harvey S**, Chappell G, Haws L. Comparison of NTP OHAT and US EPA TSCA study quality criteria: Trichloroethylene (TCE) and congenital heart defects (CHDs) as a case study. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

Borghoff SJ, **Fitch S**, Huggett, Wikoff D. A hypothesis-driven weight-of-evidence analysis to evaluate potential endocrine disrupting properties of perfluorohexanoic acid (PFHxA). 2019. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

Urban JD, **Harvey S**, Haws LC, Wikoff D. Assessment of study quality (risk of bias) in understanding the relationship between congenital heart defects (CHDs) and exposures to trichloroethylene (TCE). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

Chappell G, Welsh B, **Harvey S**, Harris M, Wikoff D. Validation and application of a text mining tool for identification and categorization of mechanistic data related to the key characteristics of carcinogens: Case studies of a problem formulation tool. Presented at the Society for Risk Analysis 2017 Annual Meeting, December 10-14, 2017. Arlington, Virginia.

Wikoff DS, Rager JE, **Harvey S**, Haws L, Chappell G, Borghoff S. Development and refinement of a framework for quantitative consideration of study quality and relevance in the evaluation of mechanistic data based on key characteristics of carcinogens. Society of Risk Analysis Annual Meeting. December 10-14, 2017. Arlington, VA.

Huggett D, **Harvey S**, Korzeniowski S, Borghoff S. The potential for 6:2 FTOH to modulate the endocrine system in wildlife: A hypothesis driven weight of evidence analysis across endocrine pathways. Presented at the Society of Environmental Toxicology and Chemistry 38th Annual Meeting, November 12-16, 2017. Minneapolis, MN.

Borghoff S, **Harvey S**, Korzeniowski S, Huggett D. The potential for PFHxA to modulate the endocrine system in wildlife: A hypothesis driven weight of evidence analysis across endocrine pathways. Presented at the Society of Environmental Toxicology and Chemistry 38th Annual Meeting, November 12-16, 2017. Minneapolis, MN.

Suh M, **Harvey S**, Wikoff D, Mittal L, Ring C, Goodmanson A, Proctor D. Meta-analysis of hexavalent chromium and stomach cancer. Presented at the Society of Toxicology 56th Annual Meeting, March 12-16, 2017. Baltimore, MD.

Chappell G, Welsh B, **Harvey S,** Harris M, Wikoff D. Validation and application of a text mining tool in the identification and categorization of mechanistic data: A case study in improving problem formulation for carcinogenicity assessments. Presented at the Society of Toxicology 56th Annual Meeting, March 12–16, 2017. Baltimore, MD.

Wikoff DS, Rager J, **Harvey S**, Haws L, Chappell G, Borghoff S. Framework for quantitative consideration of study quality and relevance in the systematic evaluation of mechanistic data per the ten key characteristics of carcinogens. Risk Assessment Specialty Section Top Ten Abstract. Presented at the Society of Toxicology 56th Annual Meeting, March 12–16, 2017. Baltimore, MD.

Doepker C, Tyndall K, Lane R, Wikoff D, Thompson C, **Harvey S**, Schmitt D. A proposed ADI for nitrate. Presented at the Society of Toxicology's 56th Annual Meeting, March 12–16, 2017. Baltimore, MD.

PROTOCOL REGISTRATIONS

Fitch S, Goyak K, Green Maia, Grimm F, Wikoff D. 2019. Estrogen-mediated outcomes for alkylphenols via an adverse outcome pathway (AOP) construct. Open Science Framework, August, https://osf.io/dwg4c/.

Wikoff D, **Fitch SE**, Payne L, Doepker C, van de Ligt J. 2019. Systematic map: Use of the acceptable daily intake (ADI) values in nutrition research studies that consider the safety of low-calorie sweeteners. https://osf.io/6x3ks/.

Tsaioun K, Dirven H, Beck Færden K, Wikoff D, Ram R, Kleinstreuer N, McCormack A, Wright R, Vist GE, **Fitch S**. 2018. Systematic reviews of the hepatotoxic effects of specified compounds/drugs as observed in humans and experimental animals (rats, mice, dogs and non-human primates). PROSPERO. Available at: http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018112353.

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Wikoff D, Borghoff S, Rager J, **Harvey S**, Haws L. 2016. A systematic review of the mechanistic evidence of tetrabromobisphenol TBBPA as a human carcinogen according to the ten key characteristics of carcinogens (TKCC) identified by Smith et al. (2016). PROSPERO 2016:CRD42016046429

Wikoff D, Doepker C, Welsh B, Urban J, Henderson R, Brorby G, Britt J, **Harvey S**, Goldberger J, Myers E, O'Brien C, Peck J, Lieberman H, Weaver C, Tenebein M. 2015. Systematic review of the adverse cardiovascular effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026673.

Wikoff D, Doepker C, Welsh B, Urban J, Henderson R, Britt J, **Harvey S**, Goldberger J, Myers E, O'Brien C, Peck J, Lieberman H, Weaver C, Tenebein M. 2015. Systematic review of the adverse bone and calcium balance effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026609.

Wikoff D, Doepker C, Welsh B, **Harvey S**, Goldberger J, Lieberman H, Myers E, O'Brien C, Peck J, Tenebein M, Urban J, Weaver C. Systematic review of the adverse reproductive and developmental effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026736. Available from http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015026736 (Systematic Review Protocol Registration).

Wikoff D, Doepker C, Welsh B, **Harvey S**, Goldberger J, Lieberman H, Myers E, O'Brien C, Peck J, Tenebein M, Urban J, Weaver C. Systematic review of acute adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. PROSPERO 2015:CRD42015026704. Available from http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015026704 (Systematic Review Protocol Registration).