SCIPINION COLLECTIVE WISDOM REPORT

Best Practices for Consumer Product Safety Management

Findings from a SciPinion Worldwide Panel of Current and Former Industry Executives, Managers and Scientists

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Table of Contents

Executive Summary

SciPinion, L.L.C. employed its proprietary approach to conducting an expert panel (collection of **Sci**entific o**Pi**nions or SciPi) to engage experts to collect their input on best practices for consumer product safety management. A range of questions were developed by SciPinion and a confidential client that focused on management practices to assessing and assuring safety of consumer products amongst consumer product companies. Experts were defined by the confidential client as individuals who work in the field of consumer product safety, and previously worked for a specific list of consumer product companies. SciPinion recruited 12 experts from all over the world to assemble a panel with the characteristics provided in Figure ES1 below. Each expert answered every question based on their experience with their former employer. The full report contains over 70 pages of insight from the experts. The following summarizes opinions on a few critical topics.

Corporate Commitment to Product Safety

The expert panel stated that product safety was extremely important to their employer and was always integrated into product design and monitored during the product life cycle. From an organizational structure perspective, most companies centralized product safety. They also had pre-clinical and clinical safety as part of the same team while post-market surveillance was handled by a separate group, but often linked with pre-clinical and clinical safety departments.

How Product Safety Was Tested and Verified

5/12 of the experts said their former employer only used third-party contractors for safety testing, while **7/12** of the experts said their former employer utilized both in-house testing capabilities and third-party contractors.

Setting Residual Standards and Monitoring for Residuals

Most companies set residual standards for impurities. These standards were either based on government regulations (e.g., Prop 65) or based on risk assessments conducted in-house. Verification procedures included requiring suppliers provide a completed questionnaire on impurity levels, requiring suppliers to provide Certificates of Analysis (CofA) either periodically or with every batch of material, and one company even had a dedicated group within the corporate structure that was devoted to getting supplier data for all materials/chemicals purchased by the Company and performed independent spot checks on impurity levels from ingredients shipped by suppliers.

Post Market Surveillance

Post-market surveillance functions amongst competitors ranged from hiring third party contractors to collect consumer complaints to vigilant in-house monitoring activities. One company had an internal safety organization (pharmaco-vigilance group - MDs and other health professionals) who assessed all health-related

complaints. Post-market surveillance signals ranged from simply monitoring for irritation (eye, skin, oral), allergic reaction (oral and skin), taste loss, headache, any systemic effects to one company having a standing committee of QA/safety/product development/regulatory staff to review all consumer complaints for a given product on a regular basis.

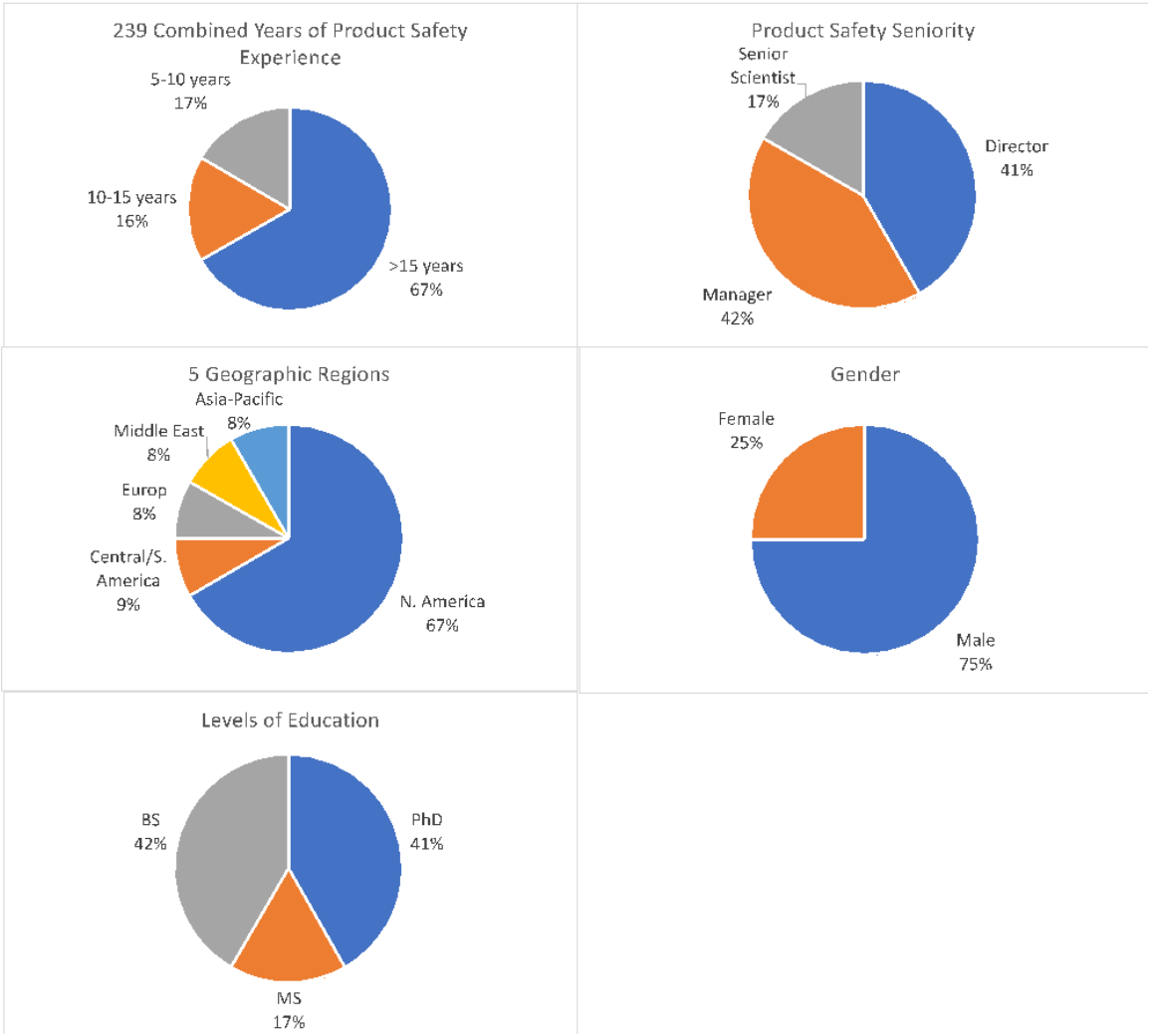
Reaction to Attacks from Public on Product Safety

All companies reported having to manage attacks on their product's safety from the public. While the standard response varied across companies, most experts recommend, in hindsight, a more proactive approach that involves defending the science. However, they also indicated that the companies had to be proactive and have their science sound and readily available, so when attacks did come, the PR group could confidently defend the company science.

Conclusions

The insight provided by 12 experts from six consumer product companies in the consumer goods sector provides valuable benchmarking of consumer products safety practices for this industry sector.

Figure ES1. Consumer Product Safety Expert Panel Composition



1. Introduction

Assuring the safety of consumer goods is a critical function that all consumer product companies constantly strive to manage, especially in these days of increased scrutiny and social activism. There are many ways to achieving safe products, monitor for safety claims once in the marketplace, and approaches to defending brands, and/or changing formulations in the face of consumer demands. This report provides insights on how the best companies choose to face these challenges.

SciPinion, L.L.C. has undertaken the task of ascertaining the 'Collective Wisdom' of best practices for consumer product safety management. To do this, SciPinion

engaged 12 experts who previously worked for well recognized consumer goods companies. SciPinion asked these experts the tough questions, to which the experts provided valuable insight on how their former employers managed product safety and in hindsight, how they would change their practice going forward. These insights now can guide your company on how best to implement management practices to assure your products are safe and you maximize efficiency in the process. The methods and results for this expert panel are summarized below.

2. Methods

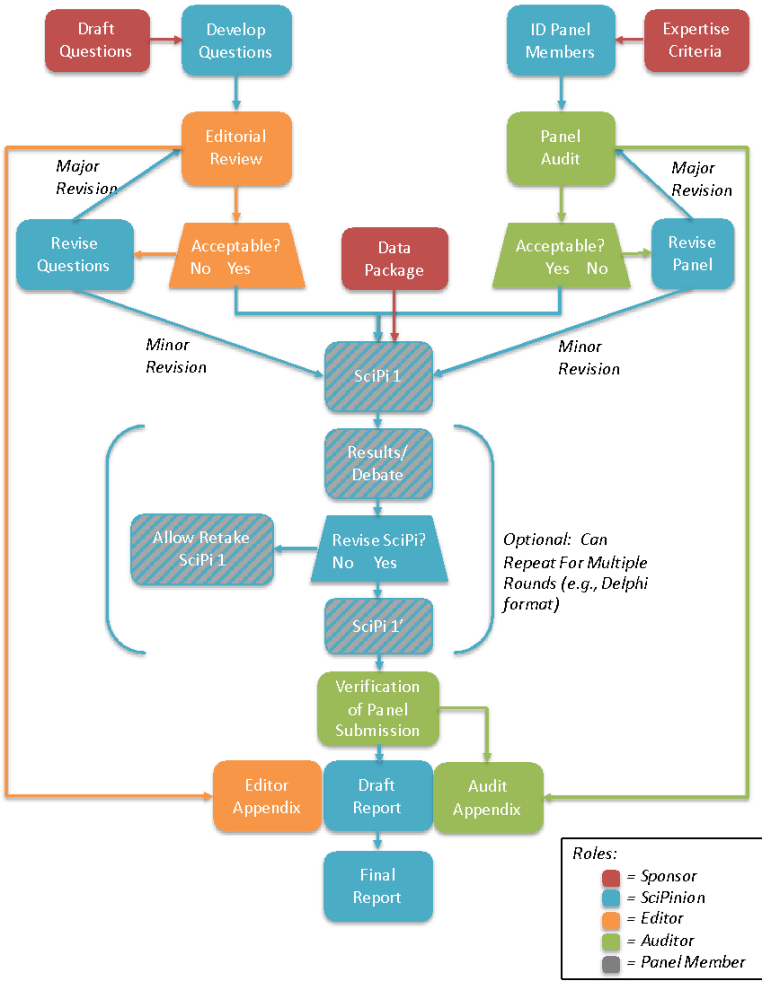
Background information on SciPinion's process of assembling and managing expert panels, including the definition of specific roles in the expert panel, the importance of anonymity, independence, and compensation are below. Additional details of our process and proof of reproducibility of our findings can be found at: https://www.sciencedirect.com/science/article/pii/S0273230019300030

2.1. Definition of Roles

Expert Panels assembled by SciPinion are conducted using the process summarized in **Figure 1**. The panel is implemented through the use of a SciPi™ (pronounced sī-pī), a series of questions soliciting the experts' ***Sci***entific o***Pi***nions. The expert panel process includes the following defined roles:

- ***Sponsor*** – The role of the Sponsor in the expert panel process is depicted in red in **Figure 1**. Specifically, the Sponsor provides the following items: (1) data package, if applicable (e.g., report, manuscript, data summary, raw data) to be reviewed; (2) minimum and desired expertise criteria for the Panel members; and (3) draft questions for the panel members that form the SciPi™. The Sponsor may be the author of the data package, a public or private entity seeking to use the data package to support a decision, or a combination of multiple stakeholders or other entities who seek to use the data package to support a decision. The Sponsor may choose to remain anonymous, known only to SciPinion.
- ***SciPinion*** – The role of SciPinion in the expert panel process is depicted in blue in **Figure 1**. As manager of the expert panel process, the role of SciPinion is defined by the following tasks: (1) coordinate all other roles; (2) finalize questions included in the SciPi to be asked of the Panel members; (3) identify and assemble the panel of Panel members; (4) implement the SciPi™; (4) prepare and finalize a report that summarizes the methods and results of the expert panel; and (5) as an option and at the Sponsor's discretion, SciPinion may post the results of public SciPis to their website (www.scipinion.com).

Figure 1. SciPinion Review Process



- ***Panel Members*** – The role of the Panel member is depicted in grey in **Figure 1**. Panel members are tasked with: (1) reviewing the data package; and (2) participating in the SciPi™ by providing their expert opinions in the answers to the questions. An important aspect of the expert panel process at the heart of the SciPi™ is that Panel members work independently. The one exception to this independence occurs in SciPis with multiple rounds in which panel members interact in later rounds (e.g., Delphi format). The other equally important aspect is the anonymity of the Panel members—to ensure they are free to offer their unbiased opinion, Panel members remain anonymous to the Sponsor and to any recipients of the report. Only SciPinion and the Auditor know the identities of the Panel members.
- ***Auditor*** (if applicable) – The role of the Auditor in the expert panel process is depicted in green in **Figure 1**. An Auditor is retained by SciPinion to independently verify that: (1) Panel members meet the minimum expertise requirements as defined for the SciPi™; and (2) the submitted responses can be attributed to the SciPinion user accounts belonging to the Panel members. The Auditor conducts the verification review through an independent audit process not under control of SciPinion or the Sponsor. The Auditor prepares a brief report containing the conclusions of their review. The identity of the Auditor(s) is included in this report.

- ***Editor*** (if applicable) – An independent Editor is retained by SciPinion to ensure that the questions in the SciPi™: (1) focus on the science issues associated with the data package; (2) are clearly written; and (3) are not leading or biased. The editor prepares a brief report containing the conclusions of his/her review. The identity of the Editor is included in this report.

2.2. Importance of Anonymity

SciPinion advocates for the use of a double-blind format for its expert panels, in which the identities of the Sponsor and the panel members are withheld. The benefits of anonymity are three-fold: (1) scientists tend to be thoughtful and often introverted and by their very nature may not be willing participants to controversy and conflict; (2) scientists may be reluctant to offer opinions about controversial topics that might make them targets of public and private attacks; and, (3) increased participation by scientists to inform the most important societal decisions that involve influential and often controversial scientific information used to support regulatory decisions. By withholding the Sponsor's identity from the Panel members, any potential bias towards the Sponsor can be minimized. By providing anonymity to the Panel members, the Sponsor can expect to receive a minimally biased opinion from the individual Panel members. If needed, experts who are willing to be identified can be recruited.

2.3. Importance of Independence

SciPinion advocates for the collection of opinions from its expert panel members using a process that ensures their independence. While it is recognized there are many benefits to allowing experts to deliberate in face-to-face settings, this also introduces some potential pitfalls. Specifically, it introduces social influences that can result in conformity rather than consensus of its members (e.g., groupthink). Some examples of these types of influences include:

- domination of deliberations by an outspoken member;
- magnification of bias (e.g., deliberating panels can adopt more extreme views when influenced by like-minded members);
- reluctance of members to confront or contradict an expert perceived as having higher status;
- domination of deliberations of information commonly shared by members regardless of its importance, at the expense of important information known by few or one member; and
- undue influence of order by which opinions are expressed (e.g., views expressed first are more likely to be repeated and confirmed).

By ensuring the independence of its expert panel members, SciPinion seeks to minimize these influences so that focus can be appropriately placed on the science issues associated with the data package. The goal of the expert panel is to improve confidence in the validity of the input received from the Expert Panel Members to support decision-making by the Sponsor. Methods are available to

permit some interaction between panel members, while minimizing these pitfalls (see description of multiple round SciPi format below).

2.4. Compensation

For some expert panels, SciPinion uses a compensated expert panel model, in recognition that: (1) large and complex data sets can require a considerable amount of time to review; and (2) the panel member's time is valuable, and is worthy of compensation. SciPinion adopts a compensated expert panel model to add value to the expert panel process, increasing its robustness both in terms of the number of scientists participating and the time spent per panel member, so that the Sponsor can have confidence that they will receive a high-quality expert panel in a timely manner to support decision-making.

2.5. Expert Panel

An independent panel of 12 experts was assembled for this work using the following steps: (1) Panel Recruitment; (2) Panel Selection; and (3) Panel Engagement. Each of these steps is summarized below.

2.5.1. Panel Recruitment

The goal of the panel recruitment is to cast as wide a net to reach out to as many potential candidates as is feasible. Invitations were sent to more than 1,662 potential candidates identified as having relevant experience in consumer product safety using: (1) SciPinion's internal database; (2) searches of profiles on social media databases (e.g., LinkedIn); (3) general internet searches; and (4) referrals. The invitations requested interested candidates to volunteer for the panel on www.app.scipinion.com and upload a copy of their CV.

2.5.2. Panel Selection

Information relevant to panel selection criteria was extracted from CVs from the 32 candidates who volunteered. The source of panel candidate recruitment had no bearing on panel selection (i.e., candidates from all five sources listed above were treated equally). 12 panel members were selected from the available candidates based upon a consideration of their expertise (years of experience, title, recency of employment with desired company) and a consideration of company coverage (no more than 3 panel members were selected from any one company).

2.5.3. Panel Engagement

Panel members were blinded to the identify of the Sponsor during recruitment and during the engagement. Panel members remained anonymous to each other and to the sponsor during and after the engagement. Compensation of $3,000 USD/reviewer was offered for an estimate of approximately 16 hours of each member's time. Email addresses corresponding to their SciPinion accounts were verified as belonging to the experts.

2.6. Questions

The following questions were asked of the experts (organized by section and corresponding to sections in the Results – see below).

2.6.1. The Use of External Guidelines, Databases, and Trade Associations

- Did your former employer(s) utilize any third party guidelines or standard setting paradigm? If so, which of the following did they follow?
- What Databases did you regularly access for product safety information and regulatory guidances?
- What trade associations did your former employer belong to that provided health/safety guidances/databases?

2.6.2. Assessment of Raw Material Safety

- How did your former employer address residuals?
- How did your former employer validate that suppliers were monitoring for impurities?
- Which ingredients did your former employer ban from all products?

2.6.3. Safety Testing

- For new ingredients and/or finished products, what assays did your former employer utilize to test for ingredient/product safety? Please also include the stage of the development cycle at which the assays are conducted and the testing frequency.
- For ingredient safety testing, was this done in-house or by third-party contractor(s)?
- Did your former employer utilize any of the following to justify ingredient safety?
- What was involved in preclinical testing strategies for ingredients? And what dictated which strategy was utilized.

2.6.4. Clinical Testing

- What was involved in clinical testing? Please explain and expand on your answers below to include general outline for study design including number of subjects tested and pass/fail criteria.

2.6.5. Claims and Exposure Assessments

- Did your formal employer make any of the following claims? If so, how did they substantiate?
- What guidance documents did you rely on for guiding the conduct of exposure assessments for your products?

2.6.6. Post-Market Surveillance

- What post market surveillance programs were in place? What did these look like? Which group collected and analyzed this information? Did you utilize any third party vendors for this effort?
- What specific post-market surveillance signals did your company look for?

2.6.7. Management Role and Organizational Structure

- How important was product safety treated within your former employer?
- Were pre-clinical safety, clinical safety and post-market safety integrated?
- At what level of management was product safety testing/monitoring integrated into the corporate structure?
- Where did product safety reside within the corporation?
- How often was your safety management practices audited?

2.6.8. External Relations Issues

- During your tenure, did you have to deal with any of the following types of product liability crises?
- How did your company manage these crises?
- What would you have done differently?
- Do you have additional thoughts on questions that should be put forward to the product safety panel?

2.6.9. Specific Safety, Labeling, and External Relations Questions

- What was your former employer's position on animal testing particularly for global cosmetic products that will be launched in countries that still require testing on certain cosmetic products (e.g., China and Russia)? For those products, how do you address "cruelty free claims" or "not tested on animals" when products are sold in other countries that don't require this testing?
- How was the endocrine disruption end point assessed at your former employer? Were there specific assays conducted to address this end point? What was the position on ingredients that have evidence of endocrine modulating effects based solely on in vitro assays?
- Did you evaluate package components for topical products? What standards were used to evaluate those components and was any migration testing conducted?
- Did you perform environmental assessments for consumer topical products? What standards were applied to perform those evaluations?
- Did you conduct "alternative assessments" as part of your safety evaluation of raw materials? What was your company's position on Green Chemistry regulation in California?
- How did you address the new GHS requirements and labelling required on safety data sheets for ingredients and finished product? Specifically, how did you address raw materials and fragrance components classified as

CMR that are used at levels that trigger labelling on finished product safety data sheet?

- Please elaborate further on your criteria for data leveraging for clinical safety patch testing (e.g., HRIPT, cumulative irritation). Was there a percent cutoff in the changes in the formula that would trigger you to test versus leveraging existing data?
- How did your company address and control Type I allergens found as potential impurities? Specifically, how did you control for those impurities in natural ingredients (e.g., oat, soy)? Did you perform a protein distribution and quantification to exclude or restrict allergenic components in those raw materials?
- How did you alert the consumer for presence of potential allergens found in the product? For example, if a topical product contains a food allergen (e.g., sodium bisulfite), is it sufficient to have it listed on the label copy or are there further precautionary measures to be taken for individuals that are sensitized to those ingredients?
- When faced with a PR issue associated with a customer/NGO alleging safety issues with an ingredient, was your former employer more likely to cave to the public's/NGO's pressures and remove the ingredient in question (even if the safety data supported its' use) or would your company defend the ingredient and keep it in the product?

2.6.10. How to Implement a Product Safety Program

- What advice would you give a small to medium sized consumer products company for implementing a minimal product safety management practices program? Please outline the various steps, corporate organization, and corporate support level. To what degree would you recommend/refer to responses generated in this SciPi?

3. Results

3.1.Expert Panel Members

The expert panel consisted of 12 members with the following characteristics:

- Geographic Location: N. America (8), Central/S. America (1), Europe (1), Middle East (1), Asia-Pacific (1)
- Titles: Director (5), Manager (5), Senior Scientist (2)
- Years of Product Safety Experience: >15 years (8), 10-15 years (2), 5-10 years (2)
- Degree: PhD (5), MS (2), BS (5)
- Gender: Male (9), Female (3)

3.2.Results for Product Safety Charge Questions to Expert Panel

The specific questions to the Expert Panel and the detailed responses from each panelist for each question are provided in the **Appendix *(available upon request)***. The questions charged to the Expert Panel covered ten major areas. A brief summary of the responses for each area is provided below.

3.2.1. The Use of External Guidelines, Databases, and Trade Associations

External guidelines and databases were well known to the expert panelists though the degree of use of external guidelines and databases varied. Large companies with extensive internal knowledge relied heavily on their own internal databases and approaches. Monitoring of the various regulatory requirements around the globe and activities within trade associations ensured that internal databases were relevant and consistent with regulatory requirements. For medium or smaller companies, the use of external guidelines and databases would provide the information needed to develop safety information and assessments needed to comply with regulatory requirements.

The complexity associated with perfumes and perfume raw materials resulted in heavy reliance by most companies on the Research Institute for Fragrance Materials (RIFM) assessments and database. Similarly, due to need to be confident in the safety assessment of cosmetics and personal care products and compliance with the many laws and regulations in this area, the guidelines of the Personal Care Products Council (PCPC) were also heavily used by the companies represented in the Panel. The databases and guidelines provided by major regulatory agencies around the globe were of course used or consulted to ensure compliance with the details and spirit of the law. Green chemistry/green product standards are often somewhat ill-defined and internal processes (e.g., Life-Cycle Analyses) were often developed, and promoted externally, to guide product development in these areas and to provide external support. Compliance with guidelines of the major regulatory agencies (e.g., US, Europe,

and to a lesser extent China and Japan) would generally ensure compliance for most markets around the globe.
Trade associations, when relevant to business needs, were useful for helping to develop guidance on specific issues, influencing regulatory agencies on these issues, and in ensuring common industry-wide approaches to issues. Trade associations are often global and/or have regional or local associations in a product area and these associations are very useful for developing harmonized rules and guidance for safety in specific product areas. Specific trade associations and their roles are described in **Appendix A.1**.

3.2.2. Assessment of Raw Material Safety

The assessment of raw materials is the fundamental starting point for determining product safety. It is import to understand that there are three components to raw materials: (1) the desired ingredient constituents; (2) residuals (e.g., unreacted synthesis residuals and/or other process aids); (3) and potential contaminants. The safety and level (concentration) of each of these components needs to be understood. Thus, it is important for specifications to be set by the purchaser so that suppliers understand what standards need to be met. The specifications should keep in mind the manufacturing process being used to make the raw material so that appropriate monitoring for undesired levels of residuals and contaminants can be designed. This includes identifying any relevant national, international, and/or regional regulations and standards that may apply.

Once specifications have been set, monitoring of raw materials can be done a number of ways, often via the supplier providing the necessary information of ingredient, residuals, and contaminant levels. These data can be provided via a supplier's certificate of analysis (CoA). The frequency of analysis should be worked with the supplier, e.g., should every lot/batch be analyzed, analysis based on some statistical standard (e.g., understanding the degree of batch to batch variation), or should the supplier only analyze the initial batch and then subsequent batches if their production method or their suppliers change.
The purchaser can also choose to have analyses done to confirm the supplier's data. Either in-house or third-party analyses can be done to spot check the supplier's compliance to the technical specifications. The establishment of in-house standard operating procedures (SOPs) for periodic audits of the supplier's compliance to the technical specifications are recommended. In short, a system for certification of the quality of the supplier is recommended. The frequency of these checks should reflect the degree of risk acceptable to the purchaser. The maker of the end product needs to consider the type and amount of exposure to a raw material component, and the nature and user of the final product, to assess the degree of acceptable risk. When there are concerns about the possible presence of "banned" or "restricted" ingredients (due to regulatory requirements) these quality checks and the supplier's CoA become essential for ensuring safety and regulatory compliance.

Examples of approaches to setting raw material specifications and how to work with suppliers to get the necessary analytical data are discussed in detail in **Appendix A.2**. In addition, there is additional discussion about how to validate suppliers and how risk can drive the degree of validation needed. Banned materials are challenging as analytical testing can often detect trace levels of virtually any material. As this can affect labeling of raw materials in the plant as well as potential labeling of the final product (e.g., California's Proposition 65 requirements, European REACH chemical regulations, etc.) assessment of raw materials requires understanding of the raw material components and the analytical testing methodologies used to assess the composition. Further discussion of banned/restricted ingredients is present in **Appendix A.2**.

3.2.3. Safety Testing

Actual safety testing of either ingredients or the final product is done as early as possible in the development cycle to ensure that any potential issues are identified as early as possible to allow for reformulation and/or design changes to eliminate the issue. As there are many types of safety tests which can be done, it is important to follow a logical process based on: (1) regulatory requirements; and (2) the anticipated exposure to the product and its components (and foreseeable misuse of the product). Testing also needs to consider the final disposal of the product to assess environmental safety, e.g., does the product end up in a landfill, does it become part of a recycle stream, or does the bulk of the product get send down a drain and into a sewage system.

Safety testing usually includes analytical data to determine concentrations and exposures, literature reviews to understand what safety information is available, checks of structure/activity databases to understand potential biological reactivity, and any specific regulatory requirements. If specific testing is needed, the selection of tests will be determined by the nature of exposure (e.g., "in you", "on you", or "near you") and the margin of safety needed for your product (e.g., a product intended for infants will likely require a higher margin of safety than a paper towel). Once these factors are understood, testing is done with a focus on the relevant safety concerns and regulatory requirements.

Common types of tests assess skin irritation, sensitization/allergic potential, microbiology (both microbial stability and the potential to affect normal microflora), eye irritation, product decomposition, etc. Many questions of safety can be initially assessed via the scientific literature, structure/activity databases, and a variety of *in vitro* tests. Animal testing is rarely done unless specifically required by a country's regulations. Small based clinical testing for confirmation of the lack of irritation and sensitization potential is common. Details of specific types of tests, and when they are used, are discussed in detail in **Appendix A.3**.

Safety testing can be done either by in-house experts or by qualified third-party contractors. Examples of some third-party contractors are given in **Appendix A.3**. Some products may also require physical testing, e.g., for choking hazards.

A variety of classification systems and/or dacision trees can be used to help make decisions about the safety risks of ingredients and products – e.g., Cramer decision tree, Threshold of Toxicological Concern (TTC), Quantitative Structure Activity Relationship (QSAR), Dermal Sensitization Threshold, etc. **Appendix.3** discusses details of the different systems and their appropriate use. International and regional standards and regulations area also useful guides which should be used.

Overall, the preclinical safety testing strategy is driven by regulatory requirements or by an exposure assessment framework based on reasonable use and foreseeable misuse of the final product. *In vivo* animal testing is rare and usually done only to meet regulatory requirements. The purpose of any testing strategy is to identify any issues early in the development cycle, determine when/if alternative ingredients are needed, ensure the safety program is consistent with the anticipated levels of exposure (both in a plant setting and at a consumer level), and ensure that potential environmental, microbial, and sustainability are also identified and addressed early. Review of the final safety program by outside experts should be considered. Again, additional details and perspective are provided in **Appendix A.3**.

3.2.4. Clinical Testing

Clinical testing is often done for products with significant dermal or oral exposure. Testing is usually relatively small-based testing (50-100 people). Dental studies are also frequently done for appropriate dental products. Intended product usage (and potential misuse) guides the type of clinical testing needed. In general, the clinical testing is considered confirmatory in nature as the prior safety testing on ingredients should have allowed product development to avoid any known or significant safety concerns. Thus, clinical testing can also help determine claims, labeling, potential impacts on quality of life, and impacts on microbiomes as well as the traditional focus on irritation and allergenicity concerns. Details of the types of tests and what constitutes the pass/fail criteria are discussed in **Appendix A.4**.

3.2.5. Claims and Exposure Assessments

Claims regarding lack of skin or eye irritation/sensitization are occasionally made for various products, especially cosmetics. In general, support for these types of claims are based on clinical testing (discussed above) as well as thorough review of the scientific literature and regulatory guidelines. Many large companies have also built up large internal databases over time which also provide support for such claims based on safety data and consumer feedback. Examples are provided in **Appendix A.5**.

Exposure assessments were generally developed based on guidance provided by regulatory agencies (FDA, EU, National Academy of Sciences, National

Research Council, international food safety authorities,) as well as the scientific literature and external advisors (e.g., recognized academic experts). Industry trade associations also provide guidelines that have been developed by their members to support various approaches to exposure assessments. Examples of different sources of guidance in this area are discussed in **Appendix A.5**.

3.2.6. Post-Market Surveillance

Post-market surveillance, also known as pharmacovigilance or cosmetovigilance, depending on the product category, is routinely done by various methods; and for certain categories (e.g., FDA regulated OTC products) it is a regulatory requirement. Different approaches can be taken using either third-party contracting, in-house expertise, or both. Post-market surveillance essentially tracks reports by consumers of alleged health effects or other problems with marketed consumer products. Analysis of reports can spot trends in health effects or product defects and allow corrections to be made to the product. Occasionally, for specific products, a post-market surveillance program may be mandatory and may include long-term clinical studies concurrent with product marketing.

Post-market surveillance needs to cover the various media by which consumers report issues and generally include the use of 800 numbers and/or email addresses on product labels, monitoring of social media, and/or input from consumer calls to regulatory agencies. Analysis of the information can be done various ways and by various company organizations. Quality Assurance is often involved in tracking and analyzing trends, but specific internal post-market surveillance groups with health professionals (e.g., medical doctors, pharmacologists, or epidemiologists) may be set up. Third-party contractors can also be used.

While most post-marketing surveillance focuses on alleged product related injuries or product failures, literally any consumer comments can be tracked and be used to create a database of consumer habits and practices. The latter can be of value for future products and/or product upgrades. It is important to understand the regulatory reporting requirements for alleged adverse health effects for different product categories (health care, cosmetics, food, etc.) and different regions (e.g., US, EU, China). The **Appendix A.6** contains discussion regarding the various ways post-market surveillance can be set up, what alleged adverse health effects are frequently tracked, how frequently the data are reviewed, how the results of this tracking are used, and the different ways companies can choose to set up post-marketing surveillance systems.

3.2.7. Management Role and Organizational Structure

Key to successful product safety management is for product safety to be a very high priority for senior management specifically and for the company as a whole. In most cases, as discussed in **Appendix A.7**, safety was a paramount concern

and a key part of the company's culture. Safety is frequently viewed as essential to a brand's integrity and ultimately of quality for both the brand and the company. Organizationally, the various groups associated with product safety (pre-clinical safety, clinical safety, and post-market surveillance) were either integrated as a single group and part of the R&D function or, if in separate organizations, they were closely linked. If third-party contractors handled parts of the product safety effort, their data were closely followed to ensure understanding of any potential issues.

Given the seriousness of product safety and the natural business demands of marketing and sales, the organizational structures discussed by the experts in **Appendix A.7** ensured that product safety reported to high level senior managers (VP or above) in the corporate structure. This arrangement ensures that the company understands the importance of product safety and that the impact of safety concerns is clearly understood and addressed by senior management. This type of high-level reporting was uniform across the various companies represented in this survey of best safety practices. The product safety organizations are frequently centralized in a company's corporate organization to most efficiently provide safety expertise across the range of a company's products. **Appendix A.7** provides discussion on the various organizational approaches to the location of safety organizations and examples exist of both centralized and decentralized approaches, as well as hybrid models seeking both the efficiency of centralization and the closeness to the business R&D of the decentralized approach. The commonality of all of the different organizational models was a company culture of product safety and direct reporting of the safety head(s) to senior business management.

Safety management practices are frequently audited. These audits could be internal more "informal" audits to external audits by regulatory authorities. The types of audits and their frequency are discussed in **Appendix A.7**. In general, it is not uncommon for safety practices and organizations to be audited at least annually. Similarly, some companies have reviews of their safety programs by third party experts to ensure the quality and thoroughness of their safety practices. Details of what was reviewed during audits by regulatory agencies are discussed in **Appendix A.7**.

3.2.8. External Relations Issues

External relations issues, also called public relations issues, can come in many forms and are challenging to manage. Issues can range from product contamination to mislabeling to political challenges (unrelated to product) to consumer chemophobia concerns. Often, these issues are accompanied by significant mainstream media and/or social media activity. Social media can often be the originating source of some issues. There are many different ways to manage these issues, but primary considerations are: (1) ensure the safety of your consumer; (2) defend the integrity of your brand/company; and (3) clear, transparent communication with all parties involved.

Actual management of an external relations issue usually is a team effort to ensure all the right knowledge and skills are available. Safety, regulatory, legal, quality assurance, communication experts, and business heads are all often involved in the issue management. Trade associations are also frequently involved if the issue is a general challenge to commonly used chemistries. The need for clear communication with the consumer or activist group where the issue originated is essential. The outcome of an issue can vary from easy resolution of the problem via open discussion with the consumer to more extreme measures of product recall and/or product reformulation.

Discussions of examples of external relations issues and how they were handled are presented in **Appendix A.8**. In addition, there is discussion regarding how these types of issues could be better managed. The key points of improvement identified were a stronger focus on proactive identification on ingredient issues (i.e., most companies tend to react to an issue versus identifying it before it becomes a problem) and ensuring rapid, data-based responses to problems. Again, clear communications, especially to the media, are important. The most difficult communication and education issue for product safety lies in the area of risk versus hazard, with most activist groups taking the position that potential hazard should be the guiding principle versus actual risk. Education regarding the difference between risk and hazard is important and challenging, with scientific peer-review publication of safety data being one critical way of establishing support for product safety. Independent, external experts can also provide crucial support for managing external relations issues by providing their perspective and, in some cases, providing review and oversight of safety programs to ensure adequacy and public acceptance.

3.2.9. Specific Safety, Labeling, and External Relations Questions

The expert panel was asked a series of specific questions related to different safety issues, the use of labeling to address safety concerns, and an additional question related to external relations issues. The experts' responses are provided in **Appendix A.9** and provide a wealth of detail and perspective based on their years of experience. Some of the common points made are summarized below.

The importance of strong senior management support of a safety "culture" in a company is critical, as is ensuring the safety and regulatory organizations have management reporting lines independent of normal product development reporting lines. Organizational structure does matter both to the company culture and to the public perception of product integrity. Also, the company needs to decide the level of risk appropriate for its product(s): infants are different from adults, food is different from laundry products, etc. This approach then needs to be built into product development from the very beginning.

Animal testing is generally avoided unless required by a specific government regulatory agency or deemed absolutely necessary to address a specific

scientific safety question, and the latter were rare. Due to differing international requirements for animal testing and “cruelty-free” claims, products may have to be reformulated for specific countries (e.g., China requires animal testing for cosmetics which is at odds with European requirements). *In vitro* testing for endocrine disruptors and other types of *in vitro* and *in silico* tests are frequent and how to approach and interpret these results are discussed. In general, the overall weight of evidence for all of the safety data was key to determining safety of a specific ingredient. Close work with government agencies in this area was also cited as important.

Packaging also was identified as part of the overall product safety assessment. Context regarding type of product, type of packaging material, the role of the package, etc. were all components to assessing packaging safety. Packaging suppliers are often a key source of safety data. Regulatory compliance is also critical here – e.g., food contact, non-food contact, recycle content, etc. all have regulations requiring compliance. Analytical data and microbial stability data are also important for packaging.

Environmental safety tended to focus on the ingredients/chemicals that reach the environment rather than on a specific product. Product chemistry (reactivity, degradation rate, etc.) and its impact on treatment systems (landfills, waste water treatment plants, recycle, compost) were evaluated in addition to any potential impact on aquatic or terrestrial toxicity. Understanding the volume of an ingredient being added to the environment is also critical to its evaluation. Different examples are provided in Appendix A discussions.

Green chemistry regulations/initiatives were briefly discussed. The need to have alternatives for product ingredients is not unique, and green chemistry options require the same assessment as other chemistry options. The novelty of some green chemistry could require even more testing if the components are not well known. Similarly, life-cycle analysis to determine whether green chemistry options were better alternatives should be considered. Overall, the evaluation of alternatives is usually an appropriate activity for reasons of product performance, safety, environmental benefits, and external relations – but the requirements for safety do not change.

Discussion on how best to leverage clinical safety patch testing data is also included in **Appendix A.9**. There are a number of different ways to evaluate and leverage these data. Context of product use, product claims, and overall experience were the key drivers. No one specific way to interpret and leverage these data was identified.

Type 1 allergens are well recognized as potential contaminants and the data needed to assess and deal with these materials were discussed. A focus on purity of ingredients, methods of formulation, the potential need for protective

equipment for personnel in manufacturing plants, product use, target consumer, and the use of labeling are all part of a robust approach to assessing the safety of allergenic materials.

The question of whether to defend the use of an ingredient in a product when challenged by a customer or NGO was also discussed further. Defense of an ingredient requires the presence of solid toxicity data and good risk assessment approaches, which is greatly aided by peer-review publication of the data. The decision to defend the use of any individual ingredient depends on the criticality of that ingredient to a product and, if a key ingredient to the overall industry, trade association support for industry-wide coordination and agreement to a response was essential. Many nuances to this question are discussed in **Appendix A.9** including examples of GMO ingredients and various preservatives. Again, the decision is a case-by-case situation and does not always depend on science, but must factor in public perceptions, NGO pressure, and whether alternatives are available.

3.2.10. How to Implement a Product Safety Program

The **Appendix A.10** concludes with a discussion of how a small or medium-sized company could implement a product safety program. Many excellent, detailed recommendations are in **Appendix A.10** and a few common thoughts to all of these recommendations include: (1) the product safety program must be thoroughly integrated into the business and clearly supported by senior management; (2) commitment to the safety of the product for its use by the consumer, the integrity of the brand and the company to the consumer is critical; and (3) do the right thing and always communicate the truth.

Whether the work is done internally or by third-party contractors, be sure to communicate clearly and truthfully. Compliance with both the spirit and the letter of the law will lead to good decisions. And the earlier in the development process safety testing is done, the easier it is to make the tough decisions. Finally, the experts were consistent in their recommendations to use all available resources: internal, trade associations, regulators, external experts, and your knowledge of your consumers.

We hope you have enjoyed this free report. If you would like a copy of the entire report with appendeces, please contact us.

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Also, if you have an idea for another topic that you think other companies would be interested in sharing the costs for, please contact us. We are designing several follow up panels and would welcome any ideas you might have.