

This is

Who we are.

What we do.

Why it matters.



Progress Report
2020-2022

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Our Vision

State-of-the-art science enables the world to enjoy fragrance

Our Mission

Build universal acceptance and trust in the safe use of fragrance materials through applied science and research

Our Core Values

Scientific excellence and objectivity/ collaboration/ transparency



Established in 1966, the **Research Institute for Fragrance Materials (RIFM)** generates, analyzes, evaluates, and distributes data to provide a scientific basis for the safe use of fragrances. RIFM has compiled the most comprehensive, worldwide source of toxicology data, literature, and general information on fragrance and flavor raw materials. RIFM's fragrance ingredient safety assessment program draws from its comprehensive database of over 78,000 references and more than 145,000 human health and environmental studies.

RIFM assesses the safety of fragrance ingredients by the most current, internationally accepted guidelines—and has done so since its founding. The Expert Panel for Fragrance Safety, an independent, international team of researchers and academics with no ties to the fragrance industry, reviews all of RIFM's work before RIFM submits it for peer-reviewed publication in a reputable scientific journal. RIFM makes all of its published, peer-reviewed work—current and historical—available for free at fragrancematerialsafetyresource.elsevier.com.

Our Defining Years

When I joined the Research Institute for Fragrance Materials (RIFM) in 2015, the organization was undergoing a profound transformation.

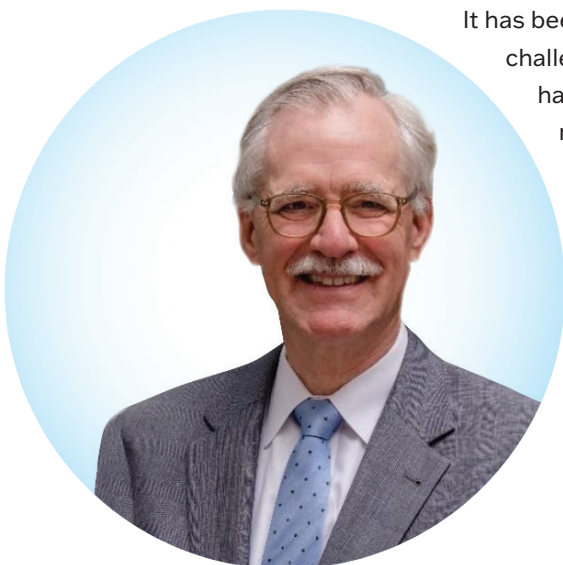
The groundwork for the most significant undertaking in the history of RIFM—the Criteria Document—had just been published. RIFM scientists, with the guidance of the independent Expert Panel for Fragrance Safety, began building on our previous safety work to create truly comprehensive, science-based evaluations of fragrance ingredients.

RIFM scientists worked diligently toward publishing comprehensive Safety Assessments for all fragrance-producing ingredients in current use. They also undertook a series of research projects to deepen and refine our understanding of fragrance safety, from clustering ingredients to expanding the palette of animal-alternative testing models. (All of RIFM's peer-reviewed research and safety evaluations, past and present, can be downloaded for free at [fragrancematerialsafetyresource.elsevier.com](https://www.fragrancematerialsafetyresource.elsevier.com).)

From 2020-2022, the Research Institute for Fragrance Materials has undergone its most productive period in memory. The pages that follow detail many of these significant accomplishments, but some highlights include:

- ▶ Accelerating the number of materials with published safety assessments from a few hundred to well over 1,500;
- ▶ Publishing more than two dozen research papers supporting our assessment work, including a Criteria Document for Natural Complex Substances (NCS);
- ▶ Ramping up the RIFM Database to include more than 6,000 materials supported by over 78,000 references translating to more than 145,000 individual human health and environmental endpoints;
- ▶ Rebranding the organization, reimagining the RIFM.org website, and communicating impactfully, resulting in increased traffic and engagement and positive coverage in The New York Times, Verify.com, and elsewhere;
- ▶ Stewarding the organization through the pandemic to ensure increased and higher-quality production, heightened morale and determination, and the lowest turnover rates in recent years.

**From 2020-2022,
the Research Institute
for Fragrance Materials
has undergone its most
productive period in
memory.**



It has been truly inspiring to oversee this organization through one of its most challenging yet productive periods. But, of course, none of this would have been possible without the generous ongoing support of RIFM's member companies and our fruitful collaborations with fragrance safety stakeholders worldwide.

Sincerely,

James C. Romine

James C. Romine, PhD
President (2015-2023)

Our Milestones

2020

RIFM rebrands with a new logo, launches Communications Strategy & Plan, and publishes its 1,000th fragrance material safety assessment. COVID-19 shuts down all in-person meetings, negating public presentations; RIFM pivots to communicate its science online via email, RIFM.org, and social media.

RIFM publishes a dozen research papers focused on animal-alternative methodologies (NAMs) in the peer-reviewed literature. The New York Times provides RIFM with its first positive mainstream exposure, which leads to numerous related mainstream press articles.

2021

RIFM launches a new website, publishes its 1,500th fragrance material assessment, and publishes another dozen papers in the peer-reviewed literature, including the Natural Complex Substances (NCS) Criteria Document. The first NCS safety assessment is submitted and accepted for publication.

2022

Our 2020-2022 Progress in Numbers

Safety Assessments

- ▶ 943 Fragrance material safety assessments posted to the RIFM Database
- ▶ 962 Fragrance material safety assessments published in Elsevier

Fragrance Safety Resource Center

- 20,498 Unique users ◀
- 41,908 Sessions ◀
- 91,871 Pageviews ◀
- 24,087 Downloads ◀

Rifm Database

- ▶ 1,000 contracted studies contributed by RIFM Members
- ▶ 350 RIFM-sponsored toxicological studies added

RIFM.org Website

- 93 News & event invites published ◀
- 474,673 Total activities ◀
- 186,461 Unique pageviews ◀

Webinars

- ▶ 1,235 Attendees at RIFM Member webinars
- ▶ 1,241 Attendees at public webinars & online annual meetings
- ▶ 848 Attendees at other hosted webinars
- ▶ 3,324 Attendees

LinkedIn

- 95,768 Organic Post Impressions ◀
- 393,297 Paid Post Impressions ◀
- 1,302 Visitors ◀
- 3,674 Pageviews ◀

Email

- ▶ 190 Sent
- ▶ 148,792 Total unique opens

Online Mentions & Coverage

- 1,439 Mentions of RIFM ◀
- 29 Articles focused on or featuring RIFM ◀

Our Collaborative Approach

Ensuring Scientific Objectivity

RIFM's work is widely referenced and used worldwide, and its safety assessments and supporting research must remain scientifically objective. Therefore, RIFM takes five critical steps, working across academia, governmental agencies, and industry, helping to ensure bias-free evaluations that allow the world to enjoy fragrance safely.

1

RIFM's work must be reviewed and approved by an oversight body of academic experts with no ties to the industry (The Expert Panel for Fragrance Safety; see FragranceSafetyPanel.org.)

2

RIFM prioritizes data that follows internationally accepted best practices and guidelines.

3

Once approved, **RIFM** submits all of its work for publication in the peer-reviewed scientific literature.

4

RIFM makes all published work available for open access to the scientific community and other fragrance safety stakeholders via The Fragrance Material Safety Resource Center; see FragranceMaterialSafetyResource.elsevier.com.

And finally, RIFM collaborates with governmental agencies worldwide to ensure that its science is reproducible by independent scientists.

Read more about how RIFM leverages critical collaborations to ensure the scientific objectivity of its work at RIFM.org/question/how-does-RIFM-ensure-scientific-objectivity



Advancing RIFM's Science

RIFM's Safety Assessment program follows the organization's peer-reviewed 2015 and 2022 Criteria Documents to ensure that consumers can safely enjoy their favorite fragranced products. It is supported by collaborative research that enhances and expands the tools used to evaluate the safe use of fragrance ingredients.

Science is never static. So as science has progressed, it is appropriate for RIFM to update its approach to safety assessment. One of the goals for the process change in the 2015 Criteria Document and the 2022 NCS Criteria Document was to identify a methodology to permit more rapid screening and evaluation of materials to support the development of RIFM's safety assessments. Programs were instituted in several areas to accomplish this. This approach provides valuable data to quickly complete safety assessments on many materials and gives a better mechanistic understanding of the results. RIFM's scientific research program has expanded in every vital area to allow for this expansion.

The overall strategy for the RIFM Research Program is to focus on developing, enhancing, and using new approach methods (NAMs) to eliminate animal testing. All RIFM research projects emphasize ways to enhance the RIFM Safety Assessment Process and to develop or reinforce existing tools. Methods to improve the risk assessment tools are strategic to RIFM and the safety of fragrance ingredients and, thereby, crucial to RIFM Member companies. Our goal is to maintain a research program that is agile and adaptable to changing external needs or requirements and to foresee unintended consequences.

A key to the RIFM Research Program is collaboration. Collaboration lays the foundation for a more open, connected, and engaged workplace

A key to the RIFM Research Program is collaboration. Collaboration lays the foundation for a more open, connected, and engaged workplace and is essential to allow groups with different expertise to be involved in a project. Collaboration also ensures no duplication of effort and opens up new avenues of communication. Finally, collaboration brings people (and organizations) closer together and allows to learn from each other.

RIFM's scientists, working with critical collaborators across academia and industry, published 19 groundbreaking, peer-reviewed papers in 2020-2022 that enhance our understanding of fragrance ingredients' safety, providing insights and methodologies to help further avoid animal and human testing.

Sincerely,



Anne Marie Api, PhD
President (2023)



2021–2022: Critical Collaborations



Holger Moustakas, PhD
Senior Scientist
Chemistry & Genotoxicity



Kaushal Joshi, PhD
Senior Scientist
Reproductive Toxicology

Clustering and Read-across

Organizing chemicals into structurally similar groups, also known as “clustering,” has helped RIFM scientists evaluate thousands of ingredients without testing them on animals.

Computational chemists working with fellow scientists from RIFM and the Expert Panel for Fragrance Safety published a paper detailing RIFM’s use of chemical clustering and read-across (using data from one substance to help understand another similar substance) in Chemical Research in Toxicology.

The Threshold of Toxicological Concern (TTC)

Consumers encounter most fragrance ingredients at extremely low exposure levels, even when adding up all fragranced products’ total (or “aggregate”) exposure.

The Threshold of Toxicological Concern, or TTC, is a level below which there is no appreciable risk of harm from a fragrance ingredient. The TTC provides an efficient, scientifically sound way to evaluate lower-exposure fragrance ingredients with limited toxicity data. Scientists compare these ingredients with similar ingredients, for which there is a lot of data. RIFM’s use of the TTC has saved more than a quarter of a million animals.

RIFM scientists, in collaboration with scientists at Procter & Gamble, published a paper summarizing the fragrance material data that RIFM collected to add to the existing database supporting TTC values in Regulatory Toxicology and Pharmacology.

One of the logical next steps in TTC’s continued evolution is to develop this concept further to represent internal exposures (TTC based on plasma concentration). An internal TTC (iTTC) would provide threshold values that could be utilized in exposure-based safety assessments. RIFM is collaborating with Cosmetics Europe in a research program, working towards developing iTTCs that can be used for human safety assessment. Through Cosmetics Europe, a Working Group comprising a balance of multiple stakeholders (RIFM, cosmetics and chemical industries, the Environmental Protection Agency [EPA] and Joint Research Centre [JRC], and academia) with relevant experience and expertise was established to evaluate the requirements to establish an iTTC critically. One of the first publications on this project appeared in *Frontiers in Toxicology*.

2021–2022: Critical Collaborations



Maura Lavelle
Scientist
Dermatotoxicology

Confirming a safe-use level

When previous skin studies suggest that a fragrance ingredient has the potential to induce skin sensitization, RIFM must confirm a safe-use level with an ethical trial in humans.

The CNIH (“Confirmation of No Induction in Humans”) is a confirmatory human patch study that RIFM performs to confirm an already determined safe use level for fragrance ingredients.

CNIHs have been used by RIFM scientists for over three decades to ethically confirm exposure levels below which there is no appreciable risk for skin sensitization.

RIFM’s skin team, working in collaboration with a team of dermal experts, published an overview of what it discovered in analyzing the last 30 years of CNIH studies in Dermatitis.



Leah Jones
Process Coordinator

Quantitative Risk Assessment (QRA)

A Quantitative Risk Assessment (QRA) is a science-based method of using large amounts of verifiable data to predict risk.

In 2008, RIFM collaborated with an international team of skin experts to publish a paper defining a dermal sensitization QRA approach for fragrance ingredients. The QRA paper guided the scientists responsible for setting maximum concentration levels for fragrance ingredients in consumer products. These maximum concentration levels, in turn, informed the International Fragrance Association (IFRA) Standards for Safe Use.

RIFM and an expanded team, including data scientists and members of the IDEA project, updated the QRA paper with an improved method for establishing safe levels for potentially sensitizing fragrance ingredients. The revised paper was published in Regulatory Toxicology and Pharmacology.



Danielle Botelho
Safety Assessment Manager

A Natural Complex Substance (NCS) “Criteria Document”

Natural Complex Substances (NCS) are fragrance ingredients extracted from plants and are complex mixtures of many components. The safety assessment of NCS is similar to and just as robust as the stepwise process RIFM uses to assess discrete fragrance ingredients. In addition, the same endpoints are evaluated via the latest science and animal-testing alternatives to ensure fragranced products’ ethical and safe use. RIFM collaborated with the Expert Panel for Fragrance Safety on the NCS Criteria Document, published in Food and Chemical Toxicology.

2021–2022: Critical Collaborations



Gretchen Ritacco
Principal Scientist
Dermatotoxicology



Yax Thakkar
Senior Scientist
Genotoxicity

A Criteria Document for Photoirritation

Photoirritation is a skin reaction that occurs when an exogenous (not something your body made) substance is applied to the skin and exposed to ultraviolet (UV) rays. In photoirritation, the affected area of the skin may resemble an exaggerated sunburn. These one-time effects go away over time and occur in anyone given enough of the substance combined with U.V. light.

For a substance to be photoirritating, it must absorb U.V. rays. However, of the more than 1,800 ingredients with no photoirritation data, some 94% do not absorb U.V. rays, meaning they pose no concern for photoirritation. This paper, a collaboration with the Institute for In Vitro Sciences (IIVS), looks at case studies of 108 ingredients that absorb U.V. rays and outlines RIFM's tiered approach to assessing their safe use with no reliance on animal testing. The paper was published in *Regulatory Toxicology and Pharmacology*.

Genotoxicity: An Animal-Alternative Assay and a Rare Case Study

When *in vitro* (in a Petri dish or test tube) studies show results for DNA mutations or chromosome breaks and alterations, an animal follow-up study was once necessary to confirm these results. RIFM's Genotoxicity team can corroborate the results with the EpiDerm 3D Reconstructed Skin Micronucleus assay. RIFM published this collaboration with scientists at Millipore Sigma and Procter & Gamble in *Mutagenesis*.

In rare cases where existing methods cannot verify a material's genetic safety, RIFM publishes its findings in the peer-reviewed literature. That material will then be banned for use as a fragrance ingredient. For example, this was recently the case with mintlactone. The findings—a collaboration between RIFM scientists and the Expert Panel for Fragrance Safety—were published in *Food and Chemical Toxicology*.

Enhancing the Use of New Approach Methods (NAMs) for Determining Skin Sensitizers

RIFM's Skin Team has published an update for Skin Sensitization to the Criteria Document. The paper details how RIFM derives the NESIL, short for "No Expected Sensitization Induction Level," using all available data. The NESIL is used to help identify maximum acceptable concentrations of an ingredient in fragranced products, which inform the International Fragrance Association (IFRA) Standards. The update was published in *Food and Chemical Toxicology*.

RIFM's innovative, science-based animal alternative methods in this area anticipated the new OECD Guideline 497: Defined Approaches on Skin Sensitization. In a collaborative paper, RIFM, L'Oréal, and Charles River Laboratories report on the results of using the U-SENS assay, which

2021–2022: Critical Collaborations

performs as well as an earlier assay included in OECD Guideline 497, the human Cell Line Activation Test, or h-CLAT. RIFM anticipates that the OECD will add the U-SENS assay to the Guideline as one of the “me too” assays. The collaborative paper was published in *Toxicology In Vitro*.

Finally, RIFM, Procter & Gamble, and other colleagues published a report on using the animal-alternative SENS-IS assay to determine the sensitization potential for fragrance ingredients. SENS-IS uses the reconstructed human skin model to assess the hazard and potency of potential skin sensitizers. The SENS-IS results were compared to the weight of evidence skin sensitization potency (see the following summary). They found that SENS-IS provides a useful approximation of skin potency to help identify ingredients for further testing. The results were published in *Regulatory Toxicology and Pharmacology*.



Isabelle Lee, PhD
Senior Scientist
Dermatotoxicology

Supporting Evidence for Skin Sensitization Potency

RIFM's Skin Team published research showing that using all available data (e.g., human, historical animal, Petri dish, test tube, and computer modeling) provides a weight of evidence for the most robust understanding of an ingredient's potency. Potency refers to the amount of a substance required to initiate an allergic skin reaction in a previously unsensitized person and is critical to deriving the NESIL. The research was published in *Dermatitis*.

Genotoxicity: Two Animal-Alternative Assays and a Screening Tool

The Genotoxicity Team published three research papers this year. The first confirms the use of the EpiDerm 3D Skin Assay and was published in *Mutagenesis*.

A collaboration between nearly two dozen scientists across academia and industry, the second paper evaluates the effectiveness of the BlueScreen H.C., a mammalian cell-based assay for measuring genotoxicity. RIFM uses the assay as a screening tool to prioritize fragrance ingredients for higher-tier testing. This report compared the BlueScreen results of 371 ingredients with *in vitro* and historical *in vivo* (animal) data and found that the BlueScreen tool did not produce false-negative results. The report was published in *Mutagenesis*.



Nikaeta Sadekar, PhD, DABT
Senior Scientist
Respiratory Toxicology

Review for Known Human Respiratory Sensitizers

A recent peer-reviewed publication reviewed the literature looking for known human respiratory sensitizers among all chemicals in current and past use. The evaluation process considered: (a) occurrences in the human population via occupational exposures; (b) consumer routes of exposure; (c) chemical identity; and (d) symptoms. The researchers observed that more than 60% (32) of the 52 reviewed chemicals previously described as causing respiratory sensitization from occupational inhalation exposure were supported with poor-quality reports or had no evidence in humans. In addition, the study authors did not include fragrance ingredients because these ingredients were neither listed nor labeled as known respiratory sensitizers. The review was published in *Critical Reviews in Toxicology*.

All of RIFM's peer-reviewed and published safety assessments and research papers can be downloaded for free at [FragranceMaterialSafetyResource.elsevier.com](https://www.fragrancesafetyresource.com).

Expanding RIFM's Science

Our Collaborative Research In Progress



Jake Muldoon, PhD
Safety Assessment
Team Researcher

Clustering and Read-across

A follow-up read-across manuscript is in its final review with plans to be submitted for peer-reviewed publication in the Fall of 2022.

A draft manuscript describing how the NCS materials were prioritized will begin in the last quarter of 2022.

The RIFM Team has also joined various committees and consortia to lend their support in defining appropriate read-across and clustering.



Aurelia Lapczynski
Principal Scientist,
Environmental Toxicology

Environmental Sciences

RIFM is working on several exciting environmental research projects to advance our environmental assessments. Three projects are in progress to support our work on NCS materials: 1) the Chances2 Project (KREATiS; LPL; University of Côte d'Azur), using a block approach to evaluate the ecotoxicity of NCS using a combination of *in vivo* and *in silico* methods; 2) the assessment of biodegradation and persistence of NCS materials (Technical University of Denmark) by combining evaluation of a whole UVCB (a substance of unknown or variable composition) degradation testing with the determination of specific constituent degradation kinetics; and 3) the *in vitro* bioaccumulation of mixtures (K.J. Scientific).

In addition, it has been 20 years since the RIFM Environmental Framework was published. RIFM has been updating the Framework to incorporate new methods and techniques to improve transparency and enhance the safe use of fragrance materials. Plans for updating another publication, RIFM Environmental Framework 2, are in place for next year.

RIFM is also developing a fragrance material Ecological Threshold of Toxicological Concern (ecoTTC) using existing RIFM data on neat ingredients. The ecoTTC is analogous to traditional human health-based TTCs but with derivation and application to ecological species. An ecoTTC is computed from the probability distribution of predicted no-effect concentrations (PNECs) derived from either chronic or extrapolated acute toxicity data for toxicologically or chemically similar groups of chemicals.

RIFM is also working on summarizing all the biodegradation data in the RIFM Database on fragrance materials. This project is of particular interest to the United States Environmental Protection Agency.

Expanding Our Science | Collaborative Research In Progress



Mary Ann Cancellieri
Associate Scientist

Exposure

The Creme RIFM Aggregate Exposure Model emphasizes realistic human exposure to fragrance ingredients. The model, which estimates a person's total potential exposure to a fragrance ingredient via all fragranced products, is the most comprehensive model of its kind. Using measured data and robust conservatisms inherent in the model helps ensure the highest degree of confidence in the conclusions published via RIFM's Safety Assessment Program. Work has been ongoing to expand the habits and practices data beyond the U.S. and Europe. For example, RIFM has collaborated with A-STAR in Singapore to obtain realistic habits and practices data for consumers in Singapore.

A collaboration with Cosmetics Europe is almost completed to obtain habits and practices data on babies (0- to 3-year-olds).

RIFM has also participated in various consortia and other groups to provide realistic exposure data on fragrance materials for various government submissions.

Genotoxicity

RIFM continues to explore the in ovo chicken egg model as another NAM. This model will help minimize the rate of misleading positives when testing in vitro for genotoxicity. A manuscript is currently under development.

Another manuscript shows how the Toxtree assay can provide RIFM scientists with information needed to identify the most appropriate animal alternative follow-up assay for materials testing positive in BlueScreen, such as the 3D skin assay or the chicken egg model, thus eliminating the need to run both tests. This manuscript has been submitted for publication.



Chaitra Deodhar, PhD
Senior Associate Scientist,
Dermatotoxicology

Phototoxicity

As mentioned above, NAMs have been used to establish a testing scheme to evaluate the photoirritation potential of fragrance ingredients. A paradigm for assessing photoallergy utilizing a battery of NAMs is currently under development. This research includes collaboration with several partners – IIVS, SenzaGen, and Shiseido. The collaboration with IIVS and Shiseido investigates the use of the photo-Direct Peptide Reactivity assay (photo-DPRA), photo-Keratinosens, and photo-human cell line activation assay (photo-h-CLAT). The collaboration with SenzaGen explores their GARDskin assay for photoallergy.



Isabella Schember, PhD
Safety Assessment
Team Researcher

Skin Sensitization

A primary overall emphasis in the research on skin sensitization is to determine ways to predict the potency (NESIL) of fragrance ingredient dermal sensitizers using NAMs. Many of the above publications provide details on tools RIFM and other scientists can use now. Future research outlined below will also help in this overall goal.

The direct peptide reactivity assay (DPRA) and amino acid derivative reactivity assay (ADRA) are validated to test the chemical's ability to activate the molecular initiating event (OECD TG442C). When combined with other non-animal methods, the DPRA is valuable in the hazard identification of skin sensitizers. However, determining the potency of skin sensitizers using non-animal methods remains challenging. Recently, it was suggested that kinetic DPRA (kDPRA) could be utilized to assign a chemical's skin sensitization potency class (Wareing et al., 2017). This modification from the standard DPRA measures the chemical's reaction with a model peptide at multiple concentrations and time points. A rate constant for this reaction is a good predictor of skin sensitization potency (Natsch et al., 2020). RIFM and IIVS generated data on 60 fragrance ingredients (49 sensitizers and 11 non-sensitizers) in the kDPRA method compared with existing animal and human data. This work will be written for peer-reviewed publication.

The GARDskin (OECD TGP 4.106) was initially developed to identify skin sensitizers by monitoring transcriptional patterns of a biomarker signature in a dendritic-like cell line. A strategy based on dose-response measurements in GARDskin, referred to as the GARDskin Dose-Response assay, has recently been proposed to derive potency information. RIFM and IFF are collaborating to evaluate the reproducibility and predictivity of this assay. Based on preliminary results from the initial dataset, GARDskin Dose-Response appears useful for potency assessment for weak sensitizers and may constitute a promising strategy for deriving a point of departure for quantitative risk assessments.

RIFM and Givaudan are exploring the relevance of materials predicted to be very weak sensitizers in the Local Lymph Node Assay (LLNA). These data are being compared to results from other NAMs on these materials.

The Expert Panel for Fragrance Safety advised RIFM to modify the CNIH assay. The modifications include applying patch test materials as soon as they have been prepared (allowing for no evaporation) and a 48-hour challenge application. Over the last two years, data on fragrance materials tested in the original and modified test methods have been collected. The data are being analyzed, and a manuscript will be prepared for publication.

The Expert Panel for Fragrance Safety recommended that the sensitization potential of unsaturated materials be investigated. Therefore, materials have been selected for evaluation, and they will be studied in the SENS-IS Assay at Immunosearch.

Skin Sensitization (continued)

RIFM continues working with scientists at Edelweiss Connect, exploring its ability to predict the skin sensitization potency of fragrance ingredients. The model combines *in silico* and *in vitro* data supporting integrated approaches to testing and assessment with a focus on the endpoint of skin sensitization.

Summaries of sensitization data that compare LLNA data to CNIH data and an overall summary of all skin sensitization data on fragrance materials continue to be collected.

iTTC

RIFM is continuing its collaboration with Cosmetics Europe in the research program, working towards developing iTTCs that can be used for human safety assessment. Through Cosmetics Europe, a Working Group comprised a balance of multiple stakeholders (RIFM, cosmetics and chemical industries, the EPA and JRC, and academia) with relevant experience and expertise to evaluate the requirements to establish an iTTC critically.

Another important next step in the evolution of the TTC is to enhance and bolster the data for the inhalation TTC. RIFM has partnered with The Fraunhofer Institute, Cosmetics Europe, the EPA, and Procter & Gamble to accomplish this goal. TTC values derived based on non-cancer data, notably by Munro et al. (1996), are well-established and are in routine use for food additive applications. However, far less attention has been focused on developing TTC values where inhalation is the route of exposure. Past efforts have included seminal work by Carthew et al. (2009) and Escher et al. (2010). Other recent work has included assessments to derive TTCs from Derived No Effect Levels (DNELs) from Hoersch et al. (2018) and Occupational Exposure Limits (OELs) from Chebekoue and Krishnan (2017). In addition, the potential application of TTC to perform risk-based prioritization for thousands of chemicals has prompted renewed attention to devising new TTC values for inhalation by Nelms and Patlewicz (2020). The project aims to create a harmonized dataset appropriately subcategorized to develop new inhalation TTC limits by leveraging cheminformatic approaches and other NAMs.

Our Greatest Resource

The RIFM Flavor and Fragrance Database

The RIFM Database is the most comprehensive worldwide source of toxicology data, literature, and general information on fragrance and flavor raw materials, containing over 6,000 materials supported by over 78,000 references translating to more than 145,000 individual human health and environmental endpoints.

RIFM reviews over 50 scientific journals monthly, conducts literature searches, and regularly collects member company data to keep the RIFM Database as current and robust as possible. There are over 1,200 RIFM Database subscribers (1,093 RIFM member subscribers, 132 FEMA subscribers, and ten non-member accounts).

Since 2020, our member companies have contributed over 1,000 of their contracted studies. In addition, RIFM continues to sponsor toxicological studies on behalf of the industry, of which more than 350 were added over the last three years.

In collaboration with IFRA, the RIFM Database has been updated with the results and new materials from the most recent Volume of Use Survey. RIFM also relies on its members to provide identity information for any newly introduced materials and clarify any reported chemicals or NCS materials. Therefore, RIFM may need to reach out to individual companies for assistance with material identity moving forward; the more information we receive from our members, the more accurate the RIFM Database can be for our subscribers.



Christen Sachse-Vasquez
Director
Technical Information & Services



Mary Mircovich
Scientific Literature Coordinator



Meghan Baretto
Scientific Literature Specialist



Kimberly Arencibia
Scientific Literature Specialist

Our Stewardship

The Finance & Operations Team



Steven Manzi
Chief Operating Officer



Tracy Foley
Operations Manager



Julie Blanker
Executive Assistant

The global pandemic brought a period of profound uncertainty to the business world. RIFM's Finance and Operations Team partnered with member companies to ensure that the organization remained fiscally sound and worked with RIFM's Science, Information, and Communications Teams to guarantee a seamless transition to an almost entirely remote working environment.

As we look to the future, we see RIFM poised to complete the assessment of discrete materials and shifting focus toward the maintenance of these assessments while moving confidently into our next phase of evaluations: the Natural Complex Substances, or NCS materials.

Telling Our Story

The Communications & Editing Team



Gary Sullivan
Marketing & Communications Manager



Faiz Siddiqi
Senior Editor



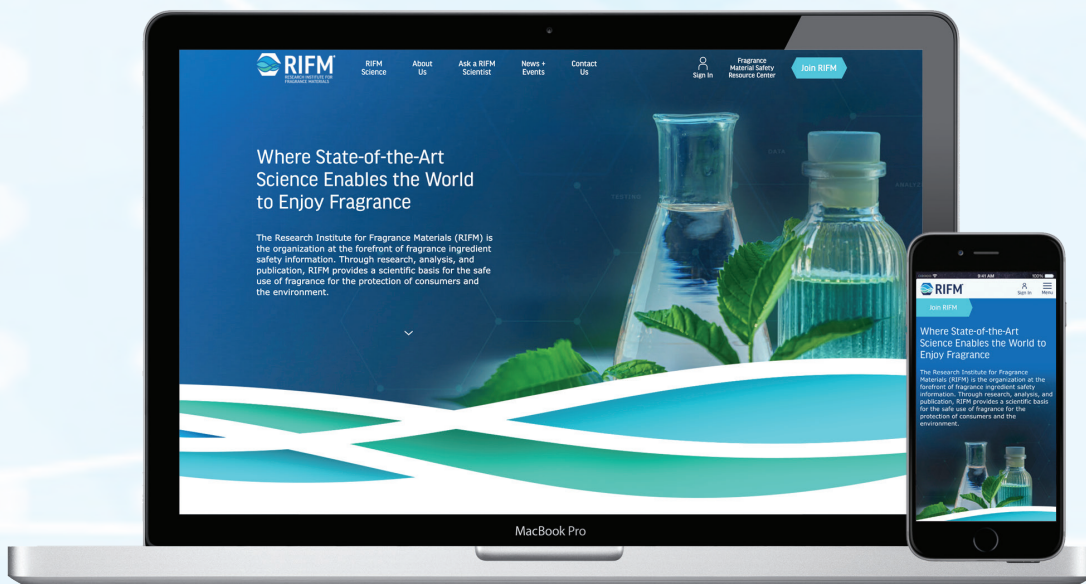
Olive Chon
Marketing Communications Specialist

On January 2, 2020, RIFM launched its new brand and began to execute its first-ever Communications Strategy and Plan to support RIFM's Organizational Strategy.

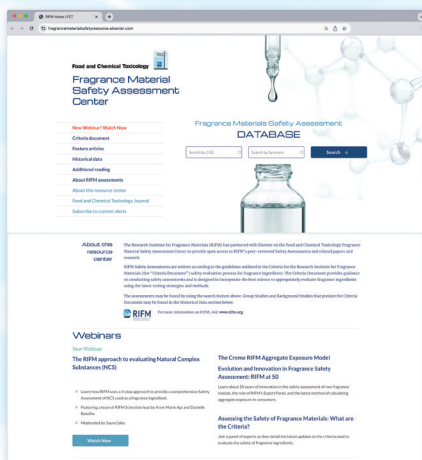
RIFM had never in its history had a Communications Strategy. Still, it was necessary to support the organization's Core Purpose and two of its critical Goals: To build acceptance and establish trust in the safe use of fragrance ingredients and gain recognition as the leader in the science supporting fragrance safety.



RIFM has gone through a significant shift since then, emphasizing itself as the science leader supporting the safe use of fragrance ingredients through its rebranding, consistent and compelling messaging, and, finally, a website audit, redesign, and relaunch, which we completed in early 2022.



Since RIFM began strategically communicating, we have seen incredible growth across all platforms: Downloads of our published science from the Fragrance Safety Resource Center are expected to exceed 20,000 in 2023 alone. But RIFM has also seen significant increases in LinkedIn engagement, RIFM.org traffic, and even unique email opens. By tracking this activity, we get a better handle on what kinds of communications our audiences prefer to engage with, which helps us refine more impactful messaging.



Our communication efforts have also led to opportunities to move our message beyond our immediate audiences, thus helping us to establish better trust and gain wider recognition, two of our critical organizational goals. For example, a video about RIFM produced by the Society of Toxicology and shown during SOT 2021 resulted in more than ten times the views we see on our YouTube channel. In addition, it increased traffic significantly to RIFM.org during the conference. The result was more online coverage of RIFM throughout the rest of the year, culminating in a New York Times story on the safety of fragranced candles that featured RIFM Respiratory Toxicologist Nikaeta Sadekar.

Most recently, our RIFM.org website relaunch strategy included two weeks of paid and targeted messaging on LinkedIn, which resulted in nearly 400,000 impressions and increased traffic to RIFM.org. As a result, May and June 2022 were the highest-ever trafficked months on our website. We expect the upward trend across our platforms to continue as we learn more about what our audiences are looking for and will respond to and find ways to reach even further beyond those who already know who we are, what we do,



Our Board of Directors (2023)

The RIFM Board of Directors ensures the success of the organization's long-range fragrance safety science goals by overseeing RIFM's direction and helping maintain its scientific, legal, financial, and ethical integrity. The RIFM Board of Directors' makeup reflects its membership diversity with directors from 15 member companies in eight countries in Asia (20%), Europe (47%), and North America (33%). During Board of Director meetings, each Director has one vote.

Executive Committee



Bhuvana Nageshwaran
Director, F & F
Ultra International Limited
www.ultrainternational.com
www.ultranl.com



Robert Weinstein, PhD
President/CEO (Chair)
Robertet, Inc
www.robertet.com



Veronique Scailteur, PhD
Director, External Relations
Perfumery
Chanel SA
www.chanel.com



Christopher Choi, PhD, DABT, ERT
Vice President, Safety & Regulatory Affairs
(Vice Chair)
Takasago International Corp USA
www.takasago.com



Steve Tanner
President/CEO
Arylessence, Inc
www.arylessence.com

Our Board of Directors (2023)

Directors



Robby Gunawan
CEO (Treasurer)
PT Indesso Aroma
www.indesso.com



Andreas Steiner
President, Fragrances North America
Symrise
www.symrise.com



Andy O'Shea
Senior Vice President
Berjé Inc
www.berjeinc.com



Maurizio Volpi
Head of Fragrances
Givaudan
www.givaudan.com



Nicholas Pickthall
Director
CPL Aromas Ltd
www.cplaromas.com



George Daher
Sr. Vice President of Global Product Safety,
Regulatory Affairs and Green Chemistry
(Secretary)
Estée Lauder
EsteeLauder.com



Thilo Bischoff
Senior Vice President Human
Nutrition
BASF
www.basf.com



Ron Stark
President & CEO
Bell Flavors & Fragrances
bellff.com



Iliaria Resta
President Perfumery
Firmenich
www.firmenich.com



Rodolphe Quérrou
Head of Regulatory Strategy and Product
Stewardship
IFF
IFF.com

Our Member Companies (2023)

RIFM is made up of 67 diverse member companies worldwide, representing 14 countries in Asia (20%), Europe (34%), and North America (46%). More than 55% of RIFM's membership makeup includes Small and Medium Enterprises. During annual meetings, each member company has one vote.

Active Members

Arylessence Inc	Harmony Organics
BASF	IFF
Bedoukian Research Inc.	Intarome Fragrance Corp
Bell Flavors & Fragrances Inc	International Aromatics
Berjé Inc.	Kimex Co.
Blue California	MANE USA Inc
Carrubba Inc	Lanxess AG
Chemia Corporation	MG International Fragrance Co
Corea Flavors & Fragrances Co. Ltd.	PFW Aroma Chemicals
Cosmo International Corp.	PT Indesso Aroma
CPL Aromas	Robertet
Firmenich	Soda Aromatic Company Ltd
Flavor & Fragrance Specialties	Sozio Inc.
French Color and Fragrances Co Inc	Symrise
French-Korean Aromatics	T Hasegawa Co.,Ltd.
Givaudan International	Takasago International Corp.
Grau Aromatics	Ultra International Limited
Hanbit Flavors & Fragrance Co.	Yingyang Aroma Group

Consumer Products Companies

Avon Products Inc

Bath and Body Works

Beiersdorf AG

Chanel

Church & Dwight

Colgate

Coty Beauty Germany GmbH

doTerra

Yves Rocher Plant Biology Laboratories

Estee Lauder Companies

GSK

Hermès Parfums

Johnson & Johnson

Kao Corporation

Kimberly-Clark

L'Oreal

P&G

Parfums Christian Dior - LVMH

Recherche

Reckitt Benckiser

Sally Beauty Supply

SC Johnson

Shiseido

Unilever

Victoria's Secret

Weleda AG

Wella Company

Yankee Candle

Associate Member

Huber Research

Statements of Activities

Year Ended
December 31

Support and Revenue	2022	2021
Membership dues	\$ 10,439,744	\$ 10,216,137
Testing income	336,544	175,000
Database income	885,116	1,080,851
Investment return	(768,641)	869,001
Sponsorship revenue	44,895	-
PPP loan forgiveness	-	543,000
Total Support and Revenue	10,937,658	12,883,989

Expenses		
Program services	\$ 9,066,319	\$9,240,826
Management and general	1,683,831	1,479,018
Total Expenses	10,750,150	10,719,844
Change in Net Assets	187,508	2,164,145

Net Assets without Donor Restrictions		
Beginning of year	5,786,296	\$3,622,151
End of year	\$ 5,973,804	\$ 5,786,296

Statements of Financial Position

Year Ended
December 31

Assets	2022	2021
Cash and cash equivalents	\$ 6,331,008	\$ 5,462,446
Dues receivable	273,929	126,827
Other receivables	33,729	9,000
Prepaid expenses	201,589	154,290
Security deposits	27,276	27,276
Investments	5,587,842	6,973,545
Property and equipment, net	152,986	184,607
Right of use asset, net	81,328	-
	\$ 12,689,687	\$ 12,937,991

Liabilities and Net Assets

Liabilities

Accounts payable and accrued expenses	\$ 6,495,945	\$ 7,084,790
Deferred revenue	133,810	66,905
Lease liability	86,128	-
Total Liabilities	6,715,883	7,151,695

Net Assets

Without Donor Restrictions

Undesignated	598,729	426,374
Board designated reserve fund	5,375,075	5,359,922
Total Net Assets	5,973,804	5,786,296
	\$ 12,689,687	\$ 12,937,991



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