

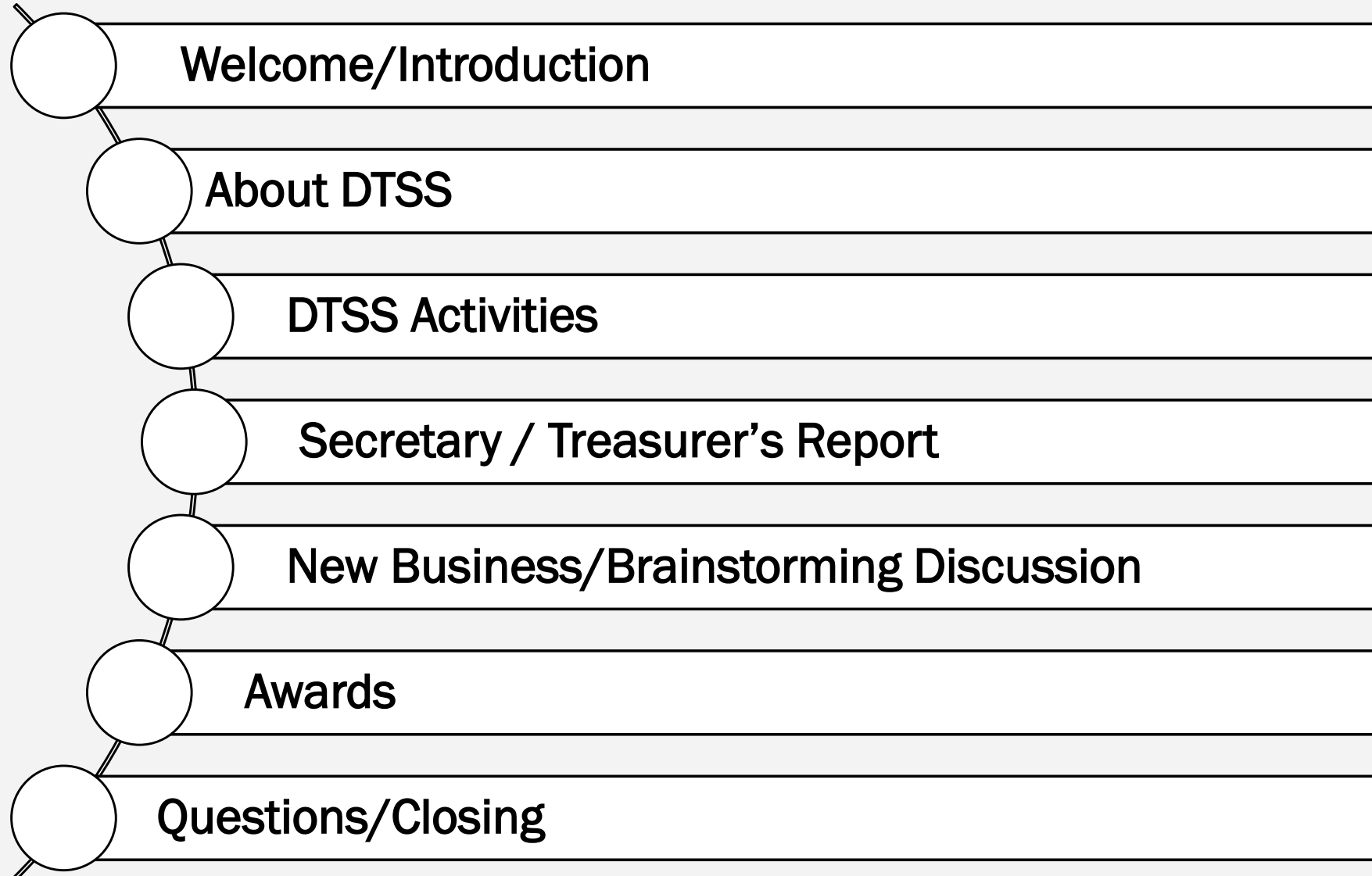
Dermal Toxicology Specialty Section

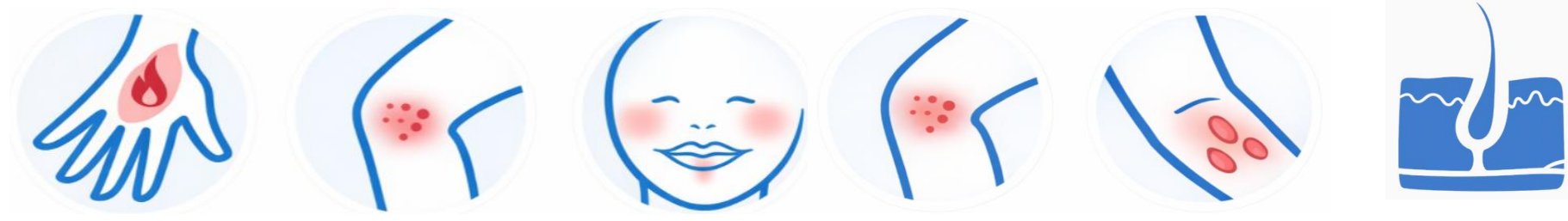
2026 Annual Business Meeting/Reception

Monday March 23, 2026

Society of Toxicology | San Diego, CA

Agenda

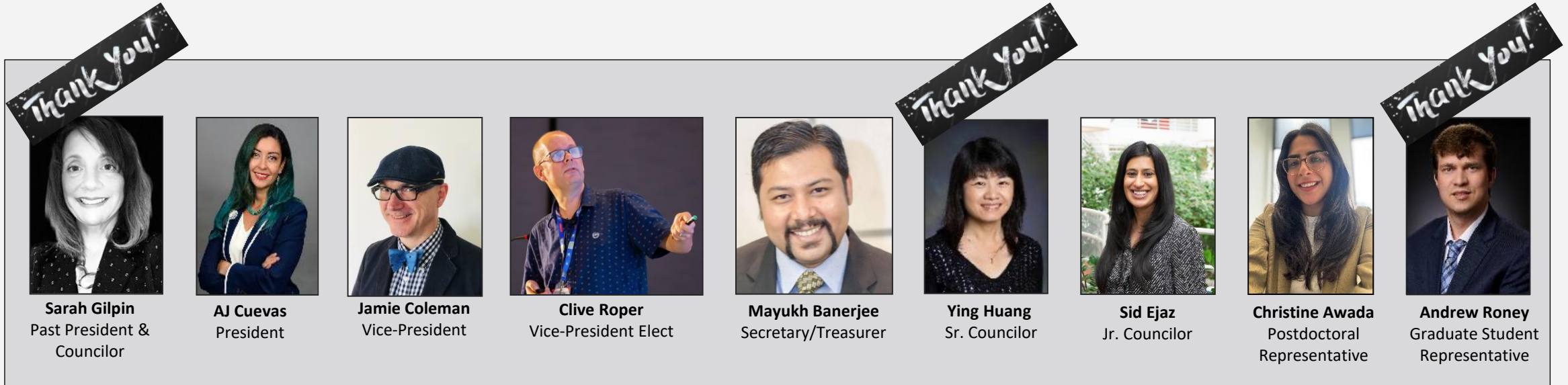




Welcome/ Introductions

Introduction

Meet the Current DTSS Officers



With gratitude, we recognize the officers completing their term on the DTSS Executive Committee:

Sarah, Ying, and Andrew

Introduction

2026-2027 DTSS Officers



			 VACANT			 VACANT		 VACANT
AJ Cuevas Past President & Councilor	Jamie Coleman President	Clive Roper Vice-President	?? Vice-President Elect	Mayukh Banerjee Secretary/Treasurer	Sid Ejaz Sr. Councilor	?? Jr. Councilor	Christine Awada Postdoctoral Representative	?? Graduate Student Representative

Vacancies:

- VP-Elect
- J. Councilor
- Graduate Student Representative

Introduction



Election Results – Congratulations Newly Elected DTSS Officers



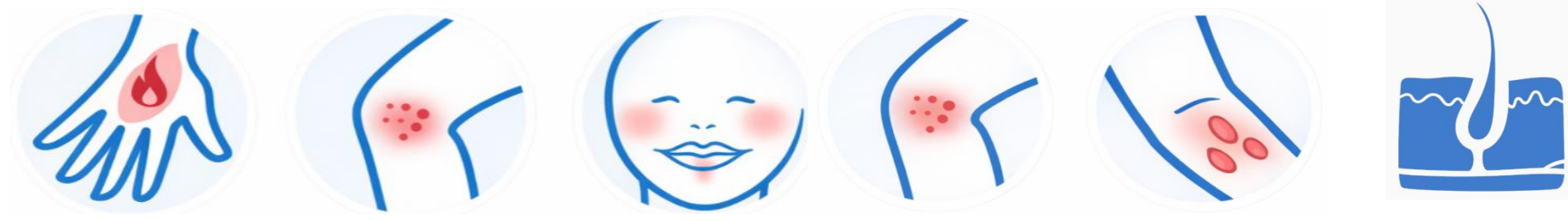
Mansi Krishan
Vice-President Elect



Hans Raabe
Jr. Councilor



Alma Avila Oropeza
Graduate Student
Representative



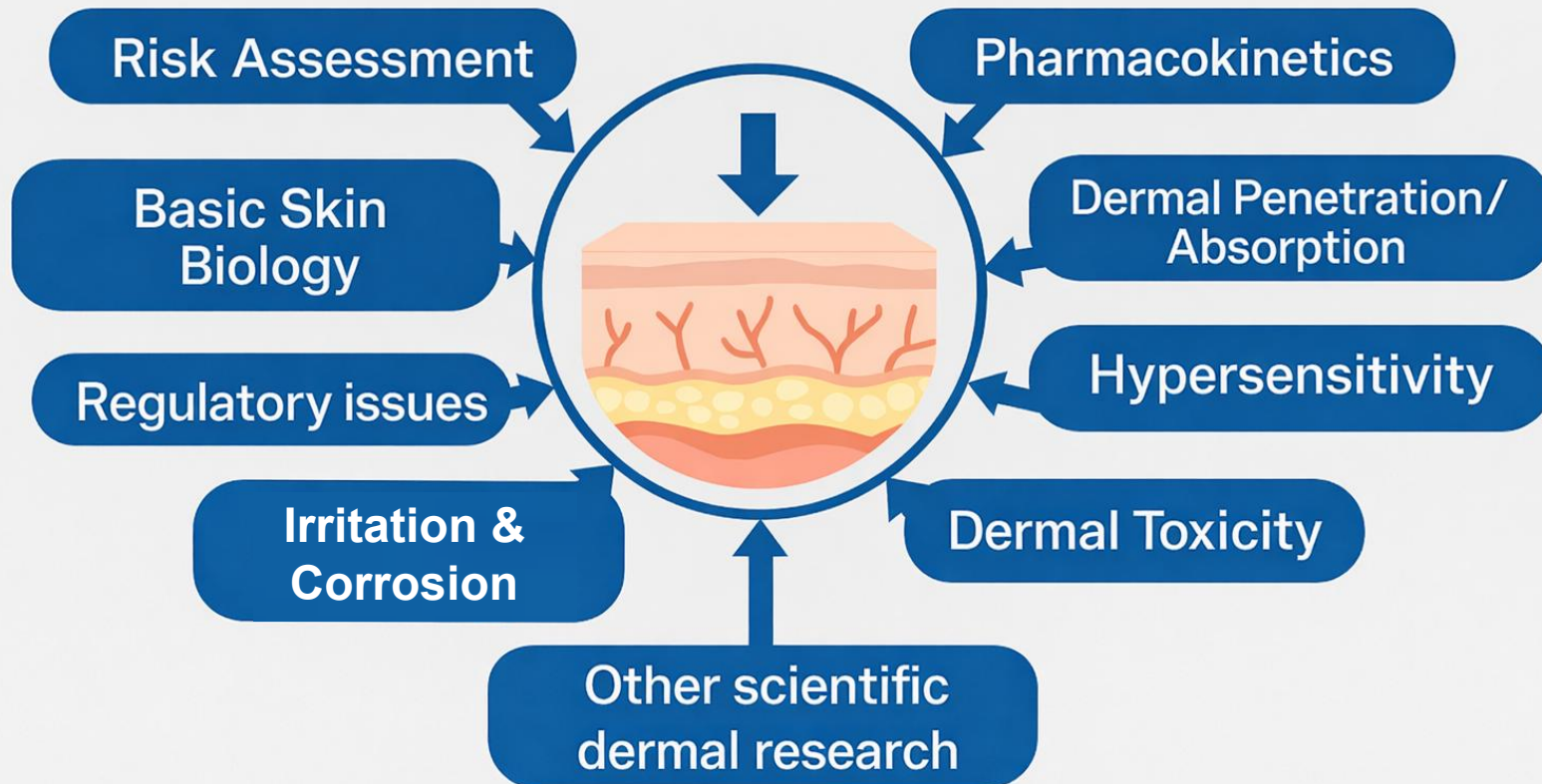
About DTSS

History of DTSS



DTSS Founded in 2000

Mission: To provide a forum for the interaction of individuals involved in:



Membership



Can join through
DTSS website
([Dermal Toxicology
Specialty Section |
SOT](#))

- 2024: 109 members
- 2025: 104 members

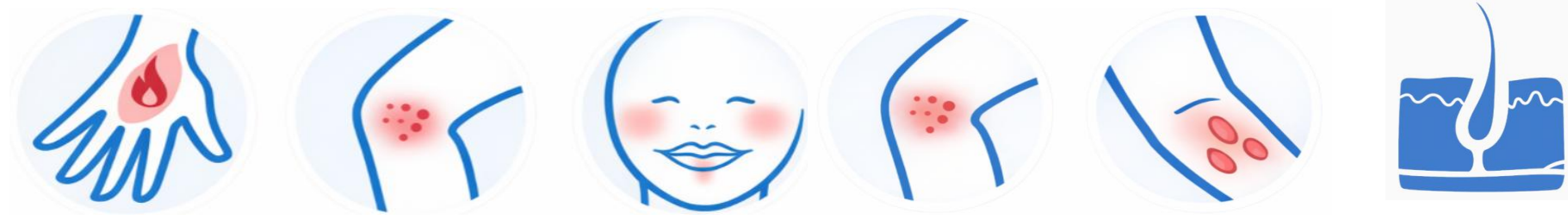


Scan to join DTSS
LinkedIn Page

- 2024: 23 members
- 2025: 61 members

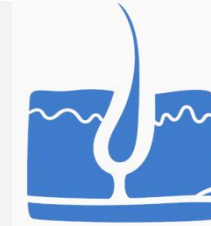


Slow and steady...



DTSS Activities

DTSS Activities – 2025



Webinars

Welcome to the SCCT and DTSS Webinar
We will begin at 10:30 AM EST

Recycled, But Safe? Tackling Contaminants in Sustainable Packaging for Cosmetics & Personal Care

June 2

SOT Sustainable Chemicals through Contemporary Toxicology and Dermal Toxicology Specialty Sections

1:33:18

Recycled, But Safe? Tackling Contaminants in Sustainable Packaging for Cosmetics & Personal Care

Hosted by: *The Sustainable Chemicals through Contemporary Toxicology (SCCT) and Dermal Toxicology (DTSS) Specialty Sections*

Speaker:

- Ramez Labib, PhD, MBA, DABT, ERT, Venebio Group, LLC
- Gerald Renner, PhD, Cosmetics Europe
- Brandon Reid, MPH, Cradle to Cradle Products Innovation Institute

Welcome to the DTSS Webinar,
We will begin at 11 AM EDT

Explore the Future of Skin Toxicology and Risk Assessment

Recognizing the 2024 DTSS Paper of the Year Award Winners

October 15, 2025

SOT Dermal Toxicology Specialty Section

1:12:02

Hosted by the *SOT Dermal Toxicology Specialty Section*

Speakers:

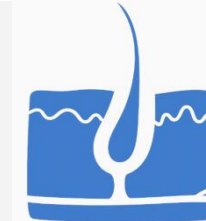
Nancy Hopf, PhD, Unisanté, Center for Primary Care & Public Health, University of Lausanne, Switzerland

Hans Raabe, MS, Institute for In Vitro Sciences, Gaithersburg, MD, USA

*2023 DTSS hosted 0 webinars; 2024 DTSS hosted 1 webinar

DTSS Activities – 2025

Newsletters – Semi-annual



Spring 2025

Spring 2025 DTSS Newsletter

Dermtology Specialty Section
OF THE SOCIETY OF TOXICOLOGY

PRESIDENT'S MESSAGE

Dear DTSS Colleagues,

When I started my tenure as DTSS President last May, I shared the DTSS Executive Committee's aims to increase the section's technical content sharing and have more frequent and valuable communications to our members. This past year we increased our output by introducing a Fall and Winter edition of our newsletters and hosted a webinar titled "A Comparative Study of the In Vitro Dermal Absorption of Radiolabeled Benzophenone Through Human Skin."

As we look forward to the coming 2025 Annual Meeting in Orlando, we wanted to use this second newsletter to highlight relevant member content; DTSS endorsed sessions so members can be sure to attend in Orlando and join us at the **DTSS Business & Reception Meeting on Tuesday March 18th 6-7:30p** in the Celebration Room 8, Hyatt Regency. This event provides a networking opportunity with those passionate about dermal science. As my call to action from the first newsletter noted, we want to hear what kinds of programming you would like to see. Additionally, we are looking to build the leadership chain, and we want to encourage a robust pool of candidates who are interested in building the future state of DTSS.

If you are in Orlando, please stop by and say hello, and if you aren't attending the Annual Meeting this year, drop me or any of the Executive Committee members a note to share an idea for a webinar, offer up an interesting publication you authored or read, find out about roles and responsibilities to serve the DTSS community on the executive board, or just to say hello.

I will close by thanking the DTSS leadership team, our sponsors, and you, our engaged members, for your enthusiasm and dedication to this Specialty Section. Please check out the [DTSS Website](#) and join us!

With kindest regards,

Sarah Gilpin, PhD, DABT
DTSS President

IN THIS ISSUE

President's Message

2026 Session Proposal Deadlines

Upcoming Webinar on Recycled Plastics

2024-2025 Executive Committee Officers

DTSS Awards Recipients

Award Sponsors Recognition

Trainee Corner and Shout Outs!

2025 SOT Annual Meeting Information

2026 SESSION PROPOSAL DEADLINE MAY 15TH

Do you have an idea for a **scientific session, symposium, workshop, or CE course** focused on **dermal toxicology** for the **2026 SOT Annual Meeting**?

This is your opportunity to contribute to critical discussions on skin exposure, safety assessment, and emerging research in the field. Share your expertise, engage with industry and academic leaders, and help shape the future of toxicology.

If you're interested in **collaborating** or already have an idea in progress, let us know—we'd love to explore potential partnerships! email ajcuevas@combe.com

WEBINAR COMING SOON!

DTSS is partnering with Sustainable Chemicals Through Contemporary Toxicology (SCTT) Specialty Section on a 90-minute webinar on the impact of recycled materials on product safety

RECYCLED, BUT SAFE? TACKLING CONTAMINANTS IN SUSTAINABLE PACKAGING FOR COSMETICS & PERSONAL CARE

As the industry continues to embrace sustainability, concerns about contaminants in recycled packaging and their potential exposure risks are gaining attention. This webinar will feature three expert speakers from Cosmetics Europe, the non-profit Cradle to Cradle, and the consulting firm Venebio Group, each offering valuable insights into this critical issue. Their presentations will be followed by a moderated panel discussion, providing an opportunity for deeper exploration and live audience Q&A. In collaboration with SCTT, this session aims to engage toxicologists, regulatory experts, and industry professionals in meaningful discussions. Join us for an insightful conversation at the intersection of sustainability and product safety. **Registration details will be distributed shortly!!**

Fall 2025

Fall 2025 DTSS Newsletter

Dermtology Specialty Section
OF THE SOCIETY OF TOXICOLOGY

PRESIDENT'S MESSAGE

Dear DTSS Colleagues,

This is my first message to you as President, and I couldn't be more honored to serve such an incredible community. Working alongside our Executive Board has been a true pleasure. Together, we've strengthened the DTSS foundation and focused on what matters most: delivering meaningful, high-quality content for our members. That said, there is more work to do. We've heard your feedback: you want to see DTSS explore emerging fields such as NAMs, Omics, and Quantitative Risk Assessment as key areas for growth—we are committed to the task.

Over the past year, we've made great strides in expanding our technical programming and improving communication across DTSS. You may have noticed—we've moved to a **biannual newsletter** and **increased the number of webinars** hosted in 2025. We partnered with the Sustainable Chemicals through Contemporary Toxicology Specialty Section (SCTT) for the joint webinar, "Recycled, But Safe? Tackling Contaminants in Sustainable Packaging for Cosmetics & Personal Care." With 140 participants, it's clear that sustainability and safety are hot topics in our field. In October, 164 registrants helped us celebrate our 2024 DTSS Paper of the Year Award winners in a webinar featuring Dr. Nancy B. Hopf (U. of Lausanne, CH) and Hans Raabe (Institute for In Vitro Sciences). These successes highlight DTSS's commitment to advancing dermal toxicology and fostering a collaborative, dynamic environment for our members.

We're also excited to announce a **new travel award** inspired by the 60th anniversary of the Research Institute for Fragrance Materials (RIFM). To commemorate this milestone, RIFM will sponsor a \$500 DTSS Trainee Travel Award for a student/trainee conducting research in NAMs, exposure science, material composition, or risk assessment. Speaking of awards, a quick reminder that **DTSS award submissions are due January 8th!** Encourage your students or postdocs to apply. If you'd like to help us judge award applications, or if you're interested in sponsoring a student award or contributing to the DTSS annual reception please reach out to me or any member of the DTSS Executive Committee—your support truly goes a long way in keeping our community strong and active!

As we wrap up 2025, this newsletter is packed with member-driven content: results from our membership engagement survey, insights on NAMs, tips for surviving PhD qualifiers, and highlights from our Fall Webinar. You'll also find award recognitions, member achievements, and details about the 2026 SOT Annual Meeting (don't miss the DTSS reception information listed on the last page!). We also are **calling for DTSS officer nominations** so consider throwing your name in the hat!

As always, we **welcome your ideas** for future programming, webinars, and leadership nominations. Your engagement and creativity keep this community thriving. Finally, a heartfelt thank you to our DTSS leadership team, sponsors, and all of you—our passionate, curious, and committed members—for everything you do to advance dermal toxicology.

Stay connected through the DTSS website and our LinkedIn posts, and don't hesitate to reach out.

A.J. Cuevas, PhD, DABT, ATS, MPH
DTSS President

IN THIS ISSUE

Apply for a DTSS Award

2025-2026 Executive Committee Officers

DTSS Membership Survey Results

Intersection of Chemistry and Toxicology

Advancing NAMs

Surviving PhD Qualifiers

DTSS Fall Webinar Summary

DTSS Member Achievements

Award Sponsors Recognition

2026 SOT Annual Meeting Information

APPLY FOR A DTSS AWARD!

It's award season! If you're a professional, graduate student, or postdoctoral member of DTSS, we encourage you to apply for a DTSS Award. The deadline is January 8, 2026.

In addition to receiving a monetary award and recognition at the DTSS Annual Reception, being selected as a winner is an excellent addition to your CV!

Scan the QR code or visit the [DTSS Awards Page](#) to learn more about the available awards.

Contact **Ying Huang** (yhuang@westernu.edu) with questions.

2025-2026 DTSS Executive Committee Officers

We want to increase membership connection—we welcome your feedback, comments, and creative suggestions to help shape our future, so don't hold back! Eager to make an impact? Run for office next year. We're looking for nominees for **Vice President-Elect, Junior Councillor, Postdoctoral Representative, and Graduate Student Representative**. To nominate yourself or someone else, reach out to [AJ Cuevas](mailto:ajcuevas@combe.com) (ajcuevas@combe.com).

Not ready for an Officer role? No problem—there are still plenty of ways to participate! Share ideas for webinars, contribute content for our newsletter, and judge annual awards. To learn more about volunteer opportunities, connect with DTSS Past President **Sarah Gilpin** (gilpin2@mnm.com).

Officers:

- Sarah Gilpin: Past President & Councillor
- AJ Cuevas: President
- Jamie Coleman: Vice President
- Chloe Roper: Vice President-Elect
- Mayukh Banerjee: Secretary/Treasurer
- Ying Huang: Sr. Councillor
- Sid Ejaz: Jr. Councillor
- Vacant: Postdoctoral Representative
- Andrew Roney: Graduate Student Representative

*2023 DTSS published 0 Newsletters; 2023 DTSS published 2 Newsletters

DTSS Activities – 2025

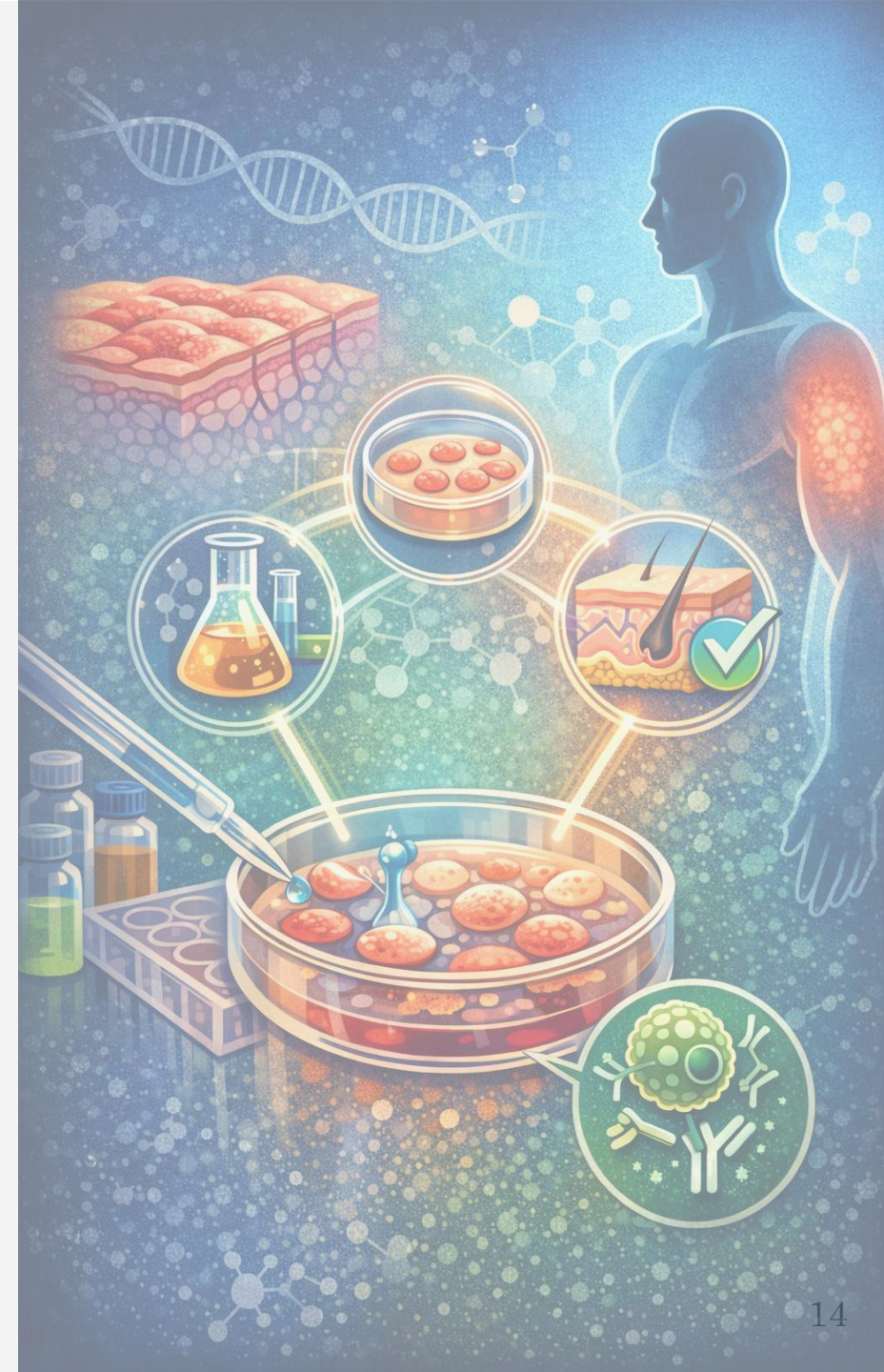
DTSS Endorsed a Symposium Session this year

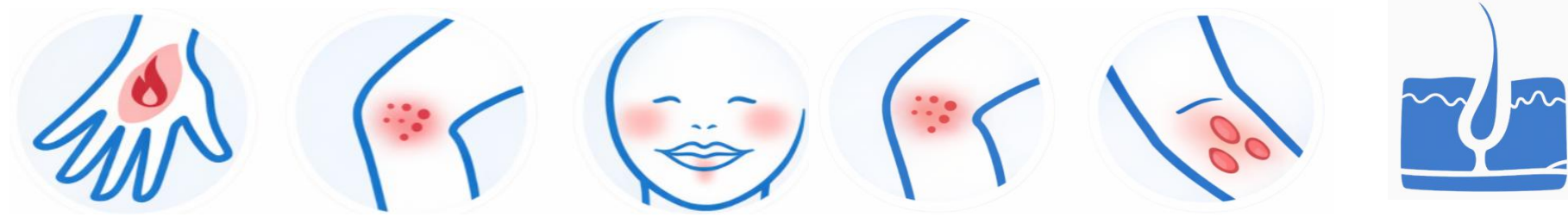
Show your Support!

**Symposium Session - *In Vitro* Testing for Skin
Sensitization of Mixtures:
Where Science Stands Today**

**Wednesday, March 25th, 8:00 – 10:45 AM (PST)
Room 7B Convention Ctr.**

Chair: Sara Farahmand, The Honest Company Inc.
Co-Chair: Kristin Yamada, Edgewell Personal Care





Upcoming DTSS Activities

Upcoming Activities – 2026



Upcoming Webinars

April 2026

Collaborative Webinar - Dermal SS and In Vitro Alternative Methods SS

Comprehensive in vitro safety assessment of Acorus calamus rhizome oil using OECD-compliant new approach methods.

On April 13, 2025 | 9:30 AM (75 min)

Speakers:



Karishma R. Desai **Dr. Rajendra M. Nagane** **Jay R. Ranade**
Jain Research Foundation, India Jain Research Foundation, India and others Jain Research Foundation, India

Join us to learn more about using in vitro dermal toxicity data—particularly for UVCBs and mixtures—to conduct risk assessments.

Coming Soon

**Upcoming Webinar
Dermal SS**

Use of the SENS-IS Transcriptomic Reconstructed Epidermis Assay in the Skin Sensitization Testing of Mixtures

Speaker: Hervé Groux, Immunosearch Labs SARL



Presentations will showcase NAM approaches that evaluate the Key Events (KE) in the Skin Sensitization AOP and methods to derive potency for use in quantitative risk assessment.

Upcoming Activities – 2026



Upcoming Webinars to highlight the 2026 DTSS Award Winners

**Coming Soon
TWO WEBINARS**

**DTSS 2026 Award Winners –
Research Highlights**

DATE: TBD



Award winners will present highlights of their research followed by an open discussion.

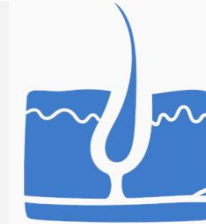
Consider presenting
your work!

Email Clive Roper:

Clive@RoperTCL.com

Upcoming Activities – 2026

Newsletters - Biannual



Spring 2026

Spring 2026 - DTSS Newsletter

Dermal Toxicology Specialty Section
OF THE SOCIETY OF TOXICOLOGY

PRESIDENT'S MESSAGE

Dear DTSS Community,

As I conclude my term as DTSS President and transition to Past-President/Counselor, I want to express my sincere gratitude for the opportunity to serve this vibrant and dedicated community. It has been a privilege to work alongside our Executive Board and with members who are deeply committed to advancing the field of dermal toxicology. Together, we have focused on strengthening the DTSS foundation while creating more opportunities for member engagement and scientific exchange. I am confident this foundation will continue to flourish under the leadership of the next Executive Committee.

A key priority during my term has been expanding both the amount and diversity of programming available to our members so that DTSS activities remain relevant, timely, and consistent. Over the past year, we increased the number of webinars and strengthened the content delivered through our biannual newsletter, allowing us to share scientific insights more regularly and keep members connected to developments across dermal toxicology. Our webinar series has been especially well received, with each session attracting more than 100 live participants and many more accessing the recordings afterward. One of the most rewarding aspects of expanding this programming has been the opportunity to collaborate with DTSS members across the community. Through planning webinars and events, I had the chance to meet and work with several members I had not previously connected with – an experience that highlights the strength of our section and the value of member engagement.

We also gathered valuable insights through our recent membership survey, which highlighted interest in emerging scientific topics and identified new volunteers eager to contribute to DTSS activities. These perspectives will help shape future programming and strengthen member involvement moving forward. While our approach continues to evolve, we know there is still more work to do. We remain committed to continuous improvement and to building a strong, engaged foundation that will support DTSS programming and member interaction well into the future. I encourage more members to raise their hand and get involved – the success of DTSS depends on two ideas, expertise, and participation of our community.

Looking ahead, 2026 is shaping up to be an exciting year for DTSS. Plans are already underway for additional webinars, events highlighting award winning research, and new initiatives designed to foster collaboration across the section. We are also launching a **DTSS logo design contest**. It has been nearly 25 years since our current logo was introduced, and we are excited to invite members to help reimagine the visual identity of DTSS. We look forward to seeing the creativity of our community reflected in designs that capture both the legacy and the evolving future of dermal toxicology. Contest details are included in this newsletter.

I would also like to express our sincere appreciation to our DTSS sponsors. Their support allows us to host a successful DTSS reception at the SOT Annual Meeting and provide DTSS Travel Awards, which help students and trainees attend the meeting and share their research with the broader toxicology community. I encourage members to consider contributing to support trainee travel awards or reception activities.

It has truly been an honor to serve as your President, and I remain excited to stay involved in helping DTSS move forward.

Stay connected through the DTSS website and our LinkedIn posts, and don't hesitate to reach out.

A.J. Casanova, PhD, MPH, DABT, ATS, ERT
2025-2026 DTSS President

IN THIS ISSUE

President's Message
DTSS Happenings at SOT
2026 Travel Award Winners
2025 Best Paper Awards
★ DTSS Logo Design Contest
Microplastics and Skin Disease
DTSS Members at SOT
Executive Committee Officers
Award Sponsors Recognition
Considering Dermal Toxicology Part 1 & 2
Thank you DTSS Sponsors
2026 SOT Annual Meeting Information

**DTSS Happenings at SOT
Attend & Support**

DTSS Reception – Mon. Mar. 23rd 6-7:30p
Grand Ballroom 13, Marriott Marquis

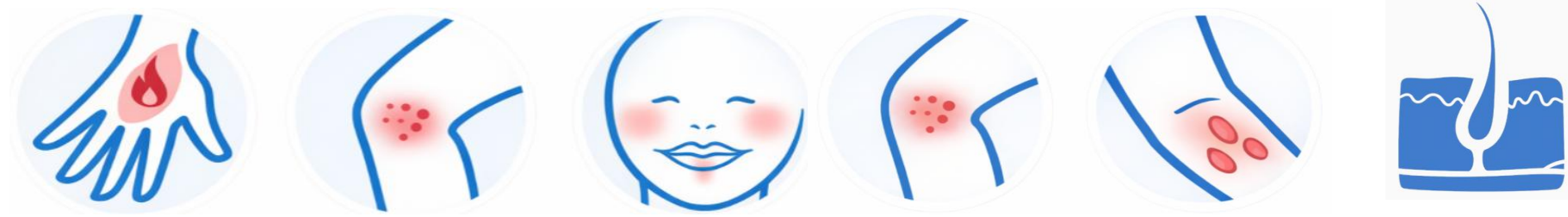
Symposium Session - *In Vitro Testing for Skin Sensitization of Mixtures: Where Science Stands Today*. Wed. Mar. 25th
8-10:45a Rm. 7B Conv. Ctr.

Dermal Toxicology Poster Session
Mon. Mar. 23rd 9:15-11:45a Exhibit Hall B

Edgewell Travel Awardee Posters:

- **Kevin Okuyama**: Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin
#3245 Mon. Mar. 23rd 9:15-11:45a
- **Sadeigh Modaresi**: Human Evaluation and Comparison of In Vitro Permeation Testing (PAPT), Barrier Function, and Lipid Composition in Alternative Skin Models and Excised Human Skin
#5193 Wed. Mar. 25th 1:45-4:15p

RIEM Trainee Awardee Poster
Catalina Gaviria: Human skin equivalents reveal multiple cell death modes in mutant agent-induced dermal injury
#3262 Mon. Mar. 23rd 9:15-11:45a



Secretary/Treasurer's Report

Secretary/Treasurer's Report

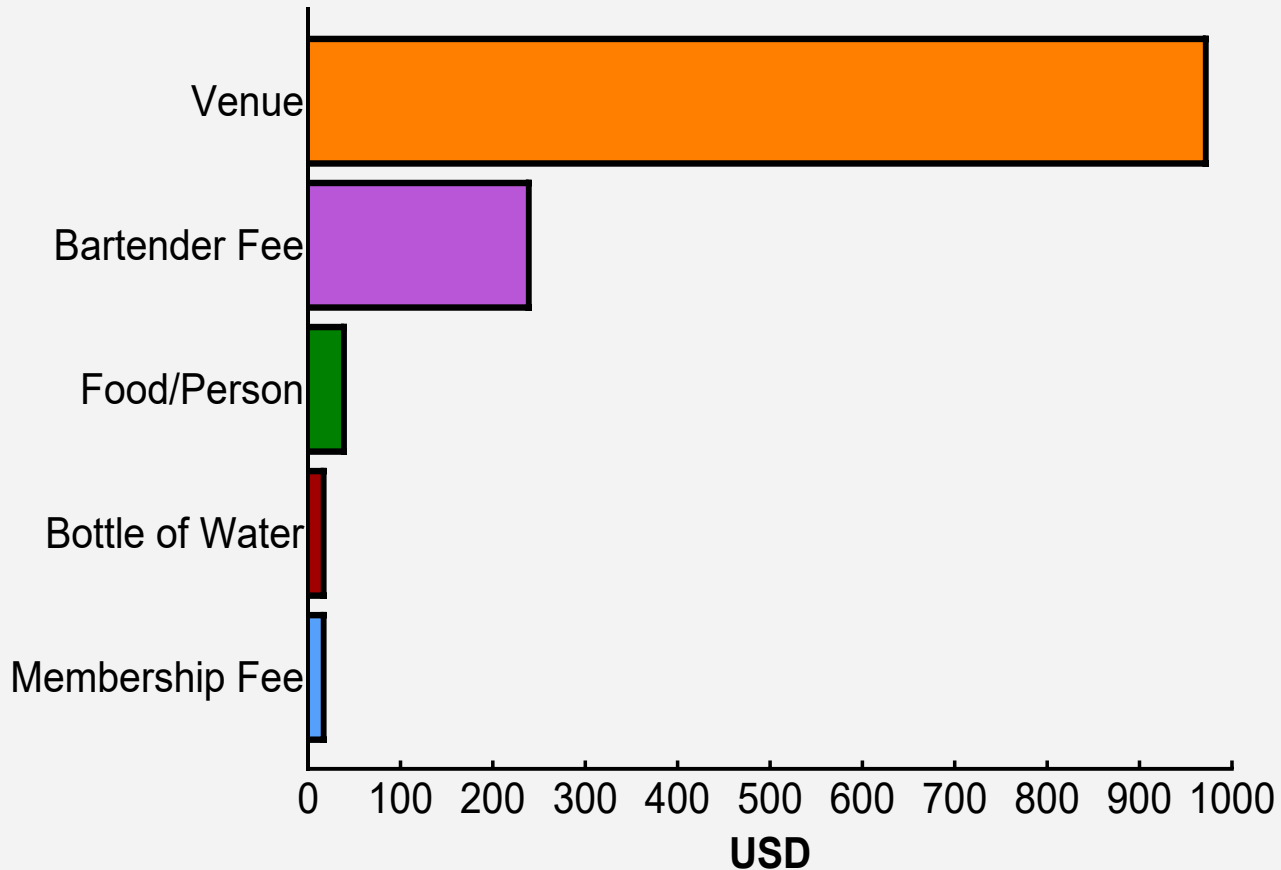


- At end of Fiscal Year 2025 –
DTSS Cash Reserve was
\$4,835
- Current reserve was sufficient
to cover the annual reception
and student awards

Secretary/Treasurer's Report



Meeting Expenses



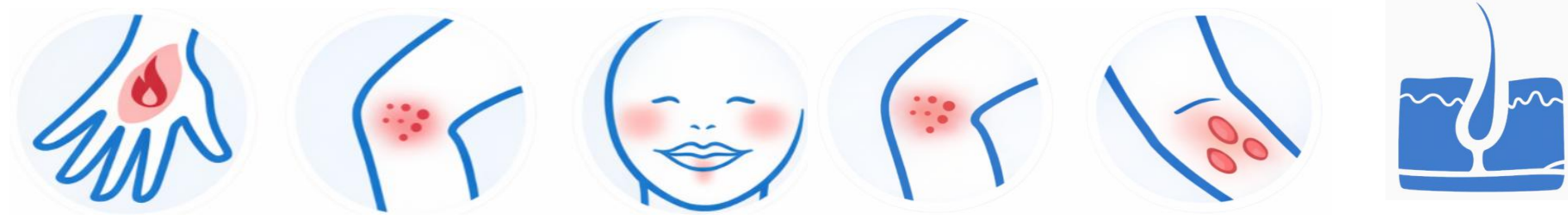
Secretary/Treasurer's Report



Consider contributing!

- Would you or your company consider sponsoring a trainee travel award?
- Donating toward the reception? (San Antonio next year)!
- Ensure you are up to date on DTSS member Dues
- Every little bit counts!

To contribute to DTSS, send contributions to SOT, c/o Rosibel Alvarenga and specifically note DTSS or email: mayukh.banerjee@louisville.edu



New Business / Discussion

New Business – Discussion



2027 Session Proposals

Submit a session proposal
for the 2027 SOT Annual
Meeting...

- Scientific session
- Symposium
- Workshop
- Continuing Education
Course
- Mentoring activity

2026 DTSS Programing

Put forward ideas or
volunteer content to...

- Webinars
- Newsletters
- Assistance in ranking
 - Awards
 - Session Proposals

Committees Participation

Join one of our
committees...or even lead
one!

- Newsletter
- Trainee/Student News &
publicity to the DTSS
Community
- Award judging/ranking

Proposals Due May 15th

Interested? Please email Clive Roper: Clive@RoperTCL.com

Shaping Future DTSS Programming

- Some convo starters....

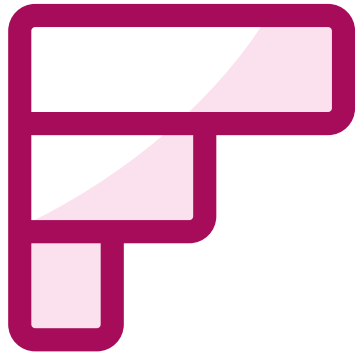




**What dermal toxicology research /
career development topics should
DTSS focus on this year?**



What expertise, experience, or perspective could you contribute to DTSS programming? (i.e. industry case studies, presenting tools/framework, research insights)?



Potential Session Themes

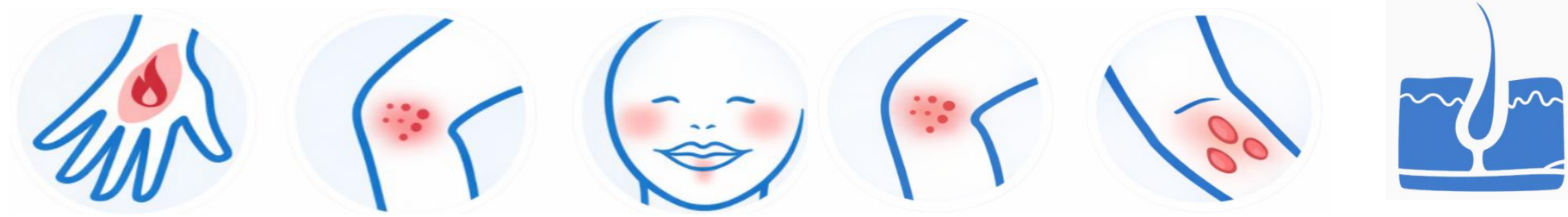
① The Slido app must be installed on every computer you're presenting from

slido

Shaping Future DTSS Programming

- Collaborator/Organizer/Support?
- Yes – I'd like to help organize
- Yes – I could speak
- Yes – I can help support efforts
- Maybe – depending on topic

Interested? Please email Jamie Coleman: Jamie.Coleman@kao.com



Awards

DTSS Awards



- Are you a trainee, student? **Apply!**
- Know a potential candidate for this award? **Encourage them to apply!**

Deadline: Jan 8, 2027

Check eligibility: [DTSS awards](#)



SPONSORS - THANK YOU for your GENERORSITY!

DTSS Awards



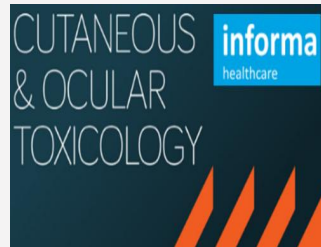
DTSS awards – This year we had Five (5) available Awards!

DTSS Annual
Paper of the Year



Award made
possible by
membership
dues

Informa Health Care
Paper of the Year



Edgewell Personal Care
Trainee Travel Awards (2)



MB Research
Trainee Tablet Raffle



SPONSORS - THANK YOU for your GENERORSITY!

DTSS Awards



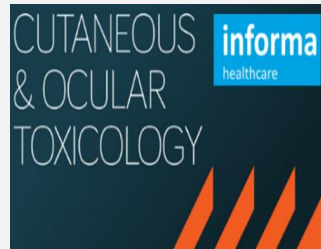
DTSS awards – This year we had Five (5) available Awards!

DTSS Annual
Paper of the Year



Award made
possible by
membership
dues

Informa Health Care
Paper of the Year



Edgewell Personal Care
Trainee Travel Awards (2)



RIFM Trainee
Travel Award



RIFM
JOIN THE LEGACY

MB Research
Trainee Tablet Raffle



MB RESEARCH
LABORATORIES

SPONSORS - THANK YOU for your GENERORSITY!



DTSS Paper of the Year

DTSS Paper of the Year Award

In Recognition of an Exceptional Publication in the Field of Skin Toxicology and Pharmacology

Jay Dawick, MS

Institution: Innospec Limited

Dawick, J., et. al. (2025). Dermal absorption and metabolism of [14C]-C12 alkyl benzoate in Finsolv TN in human skin in vitro. *Toxicological Sciences*, 1–11



SOT | Society of
Toxicology
academic.oup.com/toxsci

Toxicological Sciences, 2025, 1–11
<https://doi.org/10.1093/toxsci/kfaf082>
Advance Access Publication Date: June 12, 2025
Research article

Dermal absorption and metabolism of [¹⁴C]-C12 alkyl benzoate in Finsolv TN in human skin in vitro

Jay Dawick ^{1,*}, Lauren Kavanagh ¹, Clive Roper ², Kirsty Paris ³, Frank Toner ³, Richard Cubberley ⁴, Matthew Dent ⁴, Ruth Pendlington ⁴

¹Innospec, Limited, Innospec Manufacturing Park, Ellesmere Port Cheshire CH65 4EY, United Kingdom

²Roper Toxicology Consulting Limited, Edinburgh EH3 6AD, United Kingdom

³Charles River Laboratories, Trantree, Edinburgh EH33 2NE, United Kingdom

⁴Unilever Safety and Environmental Assurance Centre, Sharnbrook, Bedfordshire MK44 1LQ, United Kingdom

*Corresponding author: Innospec, Limited, Innospec Manufacturing Park, Oil Sites Road, Ellesmere Port Cheshire CH65 4EY, United Kingdom.
Email: jay.dawick@innospecinc.com

Abstract

C12 alkyl benzoate is present in the commercial emollient cosmetic ingredient C12-15 alkyl benzoate (Finsolv TN). Finsolv TN is a mixture of linear and branched esters of benzoic acid and aliphatic alcohols where linear C12 alkyl benzoate is a representative homolog with the shortest alkyl C-chain and lowest molecular weight. A preliminary non-GLP in vitro skin penetration study which monitored dermal bioavailability of all C12-15 alkyl benzoate constituents using GC-MS was carried out which demonstrated C12 alkyl benzoate could be considered a worst-case representative constituent to determine dermal absorption of the overall substance. Subsequently, [¹⁴C]-C12 alkyl benzoate was mixed into Finsolv TN, and applied, neat (10 µl/cm²), to dermatomed human skin mounted in a flow-through diffusion cell system. Receptor fluid was collected up to 24 h postdose and the skin was decontaminated at 8 h postdose. The absorbed dose, dermal delivery, potentially absorbable dose and dermally absorbed value of [¹⁴C]-C12 alkyl benzoate were 0.41%, 0.97%, 2.20%, and 2.97%, respectively. Metabolism during absorption was assessed in skin from the same donors, with no C12 alkyl benzoate detected in the receptor fluid, although the primary metabolite, [¹⁴C]-benzoic acid (>93%), was detected. A phenyl acetate esterase assay confirmed the presence of esterase activity in the donor skins used. Therefore, this study confirmed that dermal exposure of C12-15 alkyl benzoate (Finsolv TN) results in an absorbed dose of 2.97% completely metabolized to benzoic acid and aliphatic alcohol(s) in human skin. These findings indicate that a more in-depth investigation and assessment of toxicokinetic behavior (specifically for occupational exposures via the skin) provide opportunities to develop exposure-led strategies to avoid unnecessary animal testing allowing registrants to fulfill obligations to adhere to the "last resort" principle under REACH.

Keywords: Finsolv TN; alkyl benzoate; human skin; dermal absorption; dermal metabolism

The cosmetic ingredient with International Nomenclature Cosmetic Ingredient name C12-15 alkyl benzoate (CAS name: Benzoic acid, C12-15 alkyl esters; CAS No. 68411-27-8) is a unique nontoxic, nonirritating, nonsensitizing, noncomedogenic, and readily emulsifiable ester of C12-15 linear and branched alcohols with benzoic acid and traded by Innospec as Finsolv TN. It is an emollient and solubilizer of lipophilic cosmetic raw materials, especially sunscreen agents and volatile silicones. Finsolv TN comprises n-C12 alkyl benzoate (14.3% m/m) with predominantly linear C13-C15 alkyl benzoates with a smaller proportion of C12-C15 branched alkyl benzoates. The primary metabolites of alkyl benzoate esters via the oral route are benzoic acid and the corresponding alcohols (Adams et al. 2005; Becker et al. 2012).

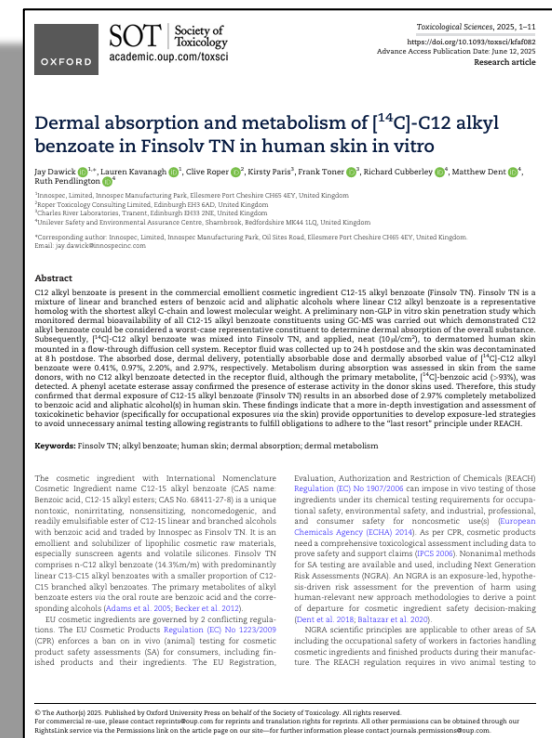
EU cosmetic ingredients are governed by 2 conflicting regulations. The EU Cosmetic Products Regulation (EC) No 1223/2009 (CPR) enforces a ban on in vivo (animal) testing for cosmetic product safety assessments (SA) for consumers, including finished products and their ingredients. The EU Registration,

Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 can impose in vivo testing of those ingredients under its chemical testing requirements for occupational safety, environmental safety, and industrial, professional, and consumer safety for noncosmetic use(s) (European Chemicals Agency (ECHA) 2014). As per CPR, cosmetic products need a comprehensive toxicological assessment including data to prove safety and support claims (IPCS 2006). Nonanimal methods for SA testing are available and used, including Next Generation Risk Assessments (NGRA). An NGRA is an exposure-led, hypothesis-driven risk assessment for the prevention of harm using human-relevant new approach methodologies to derive a point of departure for cosmetic ingredient safety decision-making (Dent et al. 2018; Baltazar et al. 2020).

NGRA scientific principles are applicable to other areas of SA including the occupational safety of workers in factories handling cosmetic ingredients and finished products during their manufacture. The REACH regulation requires in vivo animal testing to

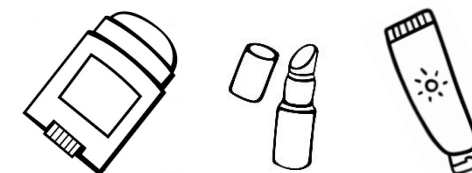
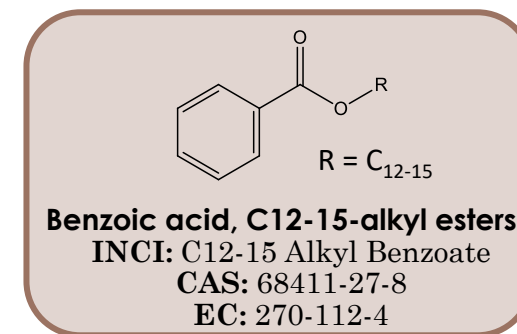
Dermal absorption and metabolism of [¹⁴C]-C12 alkyl benzoate in FINSOLV® TN in human skin *in vitro*

Jay Dawick
Senior Toxicology and Risk Assessment Manager
SOT 2026 San Diego
Dermal Tox Special Section

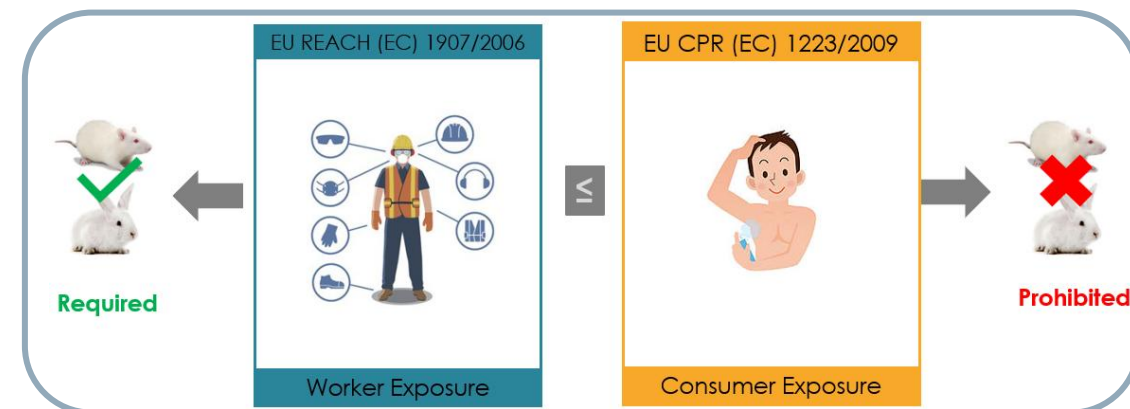


C12-15 Alkyl Benzoate Use and History

- Invented by Innospec & traded as FINSOLV® TN
- Reaction product of linear & branched C12-15 alcohols + benzoic acid
- Non-volatile hydrophobic liquid ester UVCB
- Exclusive use cosmetic ingredient (APDO, lotions, sunscreens)



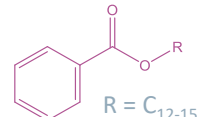
- EU REACH registered in 2010 (>1000 tpa)
 - Dossier Compliance Check 2017
 - Animal testing requested → worker safety
 - Innospec NGRA strategy to avoid
 - Skin penetration/metabolism critical for occ exposure assessment



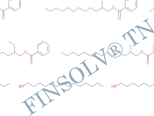
The Study!

Non-GLP Pre-test

Test Item



R = C₁₂₋₁₅



Complex UVCB- Radiolabel?

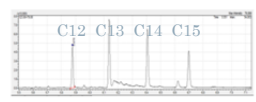
Design



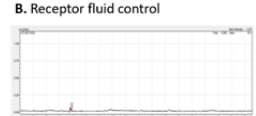
Static Diffusion
10 µL/cm²
Exposure 8h (soap wash)
Samples 0 h and 24 h post dose
GC/MS

Results

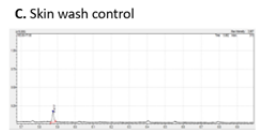
A. Finsolv® TN (500 ng/mL) standard



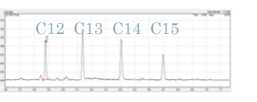
B. Receptor fluid control



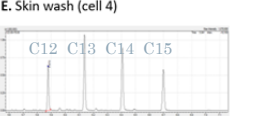
C. Skin wash control



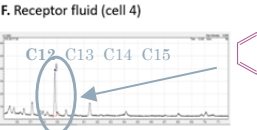
D. Skin wash recovery



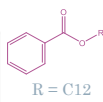
E. Skin wash (cell 4)



F. Receptor fluid (cell 4)



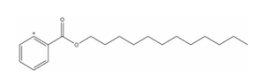
Confirmed [¹⁴C]-C12 AB Worst-Case



R = C₁₂

Main Tests
Non-GLP
Metabolism
Full GLP OECD 428

Test Item



[¹⁴C]-C12 AB spiked in Finsolv® TN

Design



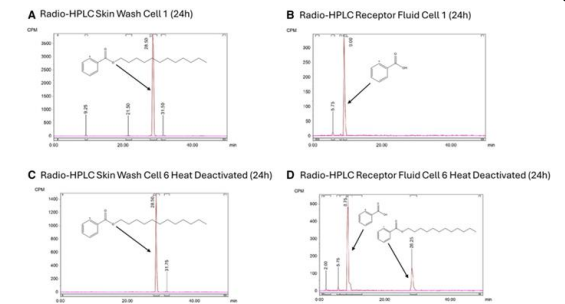
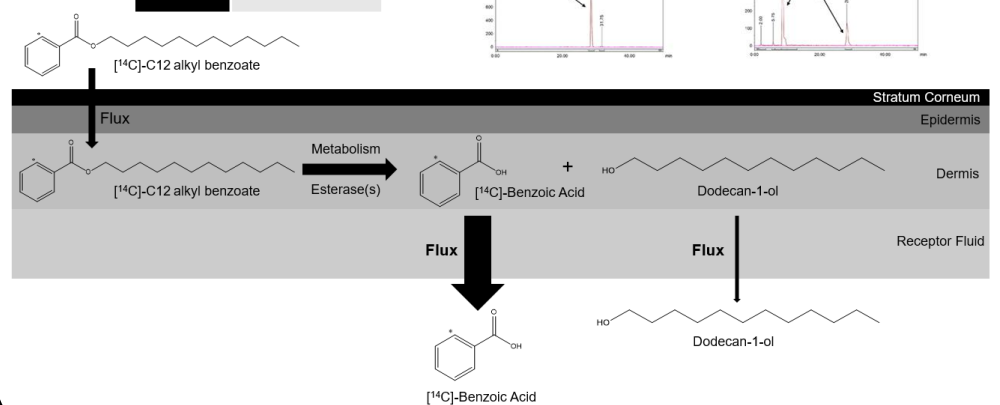
Static (metab)
10 µL/cm²
Phenyl esterase control
Heat deactivation control
Samples 1h and 24 h post dose
Radio-HPLC



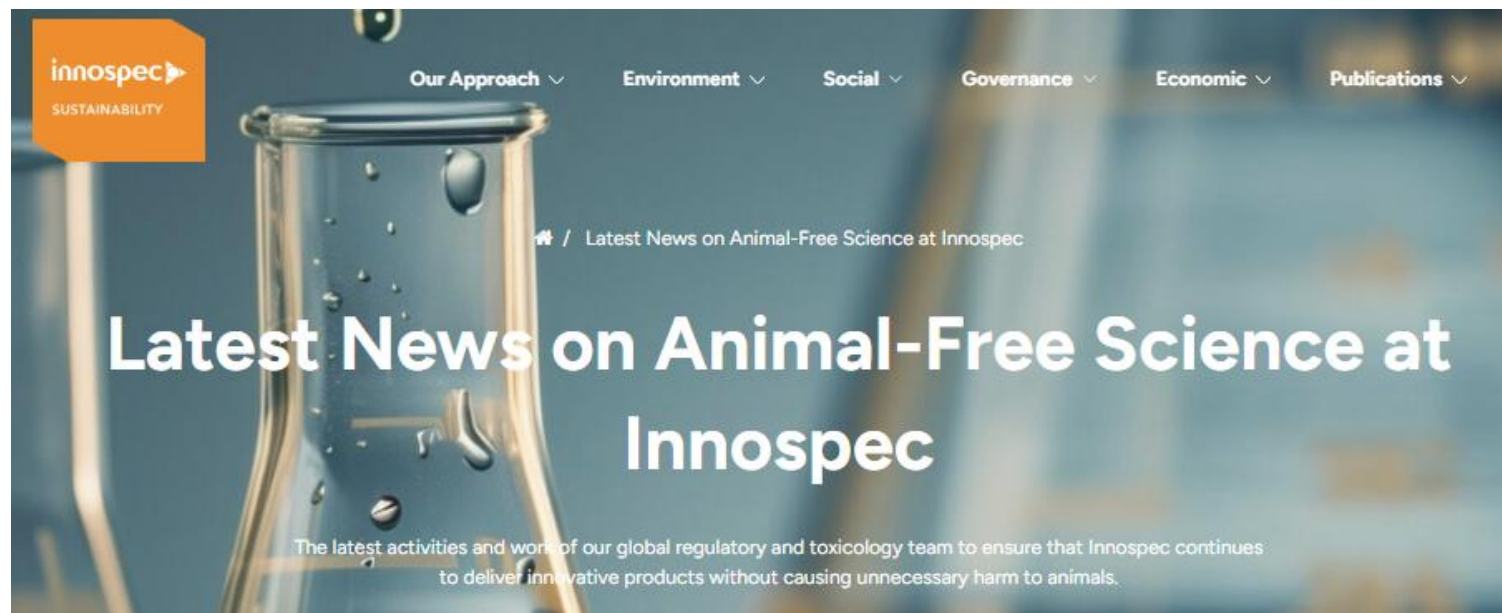
Flow-through (absorption GLP)
10 µL/cm²
Exposure 8h (soap wash)
Samples 0 h and 24 h post dose
Radio-HPLC

Results

	%Applied
AD	0.41
DD	0.97
PAD	2.20
DA	2.97

PBPK Parameterisation for NGRA and Read-Across



Informa Health Care Paper of the Year

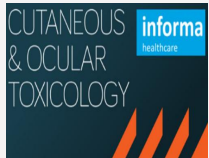
Informa Healthcare Paper of the Year Award

*In Recognition of an Exceptional Publication in the Field of
Skin Toxicology and Pharmacology*

Fuqin He, PhD

Institution: Institute of Pharmaceutical Innovation, Hubei
Province Key Laboratory of Occupational Hazard
Identification and Control, School of Medicine, Wuhan
University of Science and Technology, Wuhan, China

He., et. al. (2025). Tobacco ethanol extract accelerates
wound healing through anti-inflammation and promoting
angiogenesis. *Journal of Cutaneous and Ocular
Toxicology*, 44:4, 470-479



CUTANEOUS AND OCULAR TOXICOLOGY
2025, VOL. 44, NO. 4, 470-479
<https://doi.org/10.1080/15569527.2025.2559680>

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RESEARCH ARTICLE

Tobacco ethanol extract accelerates wound healing through anti-inflammation and promoting angiogenesis

Fuqin He^a, Yongjun Liu^b, Ruiying Yu^a, Tianli Zhang^a, Fang Guo^a, Xiayu Wu^a, Yi Fan^a, Xuedong Zhu^a,
Qianyi Zhou^a and Dan Shu^a

^aInstitute of Pharmaceutical Innovation, Hubei Province Key Laboratory of Occupational Hazard Identification and Control, School of Medicine, Wuhan University of Science and Technology, Wuhan, China; ^bHunan Tobacco Science Research Institute, Changsha, China

ABSTRACT

Objective: Wound repair remains a significant challenge in the field of regenerative medicine. Notably, while numerous studies have investigated the effects of isolated nicotine or chlorogenic acid, the systematic evaluation of tobacco ethanol extract (TEE) on cutaneous wound healing has remained uncharted territory. Therefore, this study aims to systematically explore TEE's multifaceted effect on wound healing.

Methods: The hepatorenal toxicity of 5% TEE was evaluated in 6-7-week-old ICR mice. Subsequently, full-thickness 6mm wounds were created, and images were captured on days 0, 3, 6, 9, and 12. Tissues were collected for H&E staining, Masson trichrome staining, and immunohistochemistry to assess wound healing.

Results: The TEE we prepared showed little hepatorenal toxicity ($p > 0.05$). By day 12, the wound closure rate in the TEE group reached 95.26%, significantly higher than that in the vehicle group (89.20%, $p < 0.05$). Histopathological analysis demonstrated that TEE reduced neutrophil infiltration in the wound tissues, accelerated granulation tissue formation, and increased collagen content by 20.99% compared to the vehicle group ($p < 0.05$). Immunohistochemical staining revealed that on day 6, the positive areas of IL-6 and TNF- α in the TEE group were 5.91% and 4.87% lower than those in the vehicle group ($p < 0.05$), respectively. On day 9, CD31 expression in the TEE group (8.58%) was significantly higher than that in the vehicle group (5.54%) ($p < 0.05$).

Conclusion: This study reveals that TEE accelerates wound healing, providing new insights into effective topical therapies for skin wounds while highlighting the potential for tobacco waste valorization.

ARTICLE HISTORY

Received 16 April 2025
Revised 8 August 2025
Accepted 8 September 2025

KEYWORDS

Collagen; inflammation;
neovascularization;
tobacco extract; wound
healing

1. Introduction

The skin serves as a vital barrier against pathogen invasion and dehydration. Compromised skin integrity increases infection risks and impedes tissue repair, imposing substantial clinical burdens [1]. Wound healing is a complex process involving four stages: hemostasis, inflammation, proliferation, and remodeling [2]. Hemostasis: Platelet activation initiates coagulation cascade, generating thrombus and fibrin clots to control bleeding and limit microbial invasion [3]. Inflammation: Neutrophils, macrophages, and lymphocytes infiltrate the wound, releasing pro-inflammatory cytokines/growth factors to eliminate pathogens and activate repair cells [4]. Proliferation: Angiogenesis, fibroblast proliferation, and collagen deposition form granulation tissue, enabling re-epithelialization [5,6]. Remodeling: Collagen III is replaced by stronger

collagen I, with extracellular matrix (ECM) reorganization yielding mature scar tissue [7]. Dysregulation at any of these stages may lead to impaired healing.

As a major tobacco producer, China cultivates *Nicotiana tabacum* containing various bioactive compounds including alkaloids, solanesol, chlorogenic acid, polyphenols, and terpenoids [8]. Crucially, tobacco processing generates significant waste streams rich in these underutilized bioactive substances [9]. Particularly noteworthy is that nicotine alleviates inflammatory responses via nicotinic acetylcholine receptor signaling [10]. And our previous studies have demonstrated that nicotine can act as a procoagulant through specific modulation of the platelet function activation pathway, showing potential as a novel hemostatic agent [11]. Chlorogenic acid demonstrates antioxidant, anti-inflammatory, antibacterial, and antiviral properties

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Supplemental data for this article can be accessed online at <https://doi.org/10.1080/15569527.2025.2559680>.

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Edgewell Personal Care Trainee Travel Awards

Edgewell Personal Care Trainee Travel Award

In recognition of outstanding Postdoctoral Fellows and Graduate students for their contribution to dermal toxicology

Sadegh Modaresi, Ph.D.

Institution: National Center for Toxicological Research,
U.S. Food and Drug Administration

Title: *Human Evaluation and Comparison of In Vitro Permeation Testing (IVPT), Barrier Function, and Lipid Composition in Alternative Skin Models and Excised Human Skin*

Poster #5193 – K757 Wed. Mar 25th 1:45-4:15p



Evaluation and Comparison of In Vitro Permeation Testing (IVPT), Barrier Function, and Lipid Composition in Alternative Skin Models and Excised Human Skin

5193: Poster Board - K757: Wednesday March 25th

Background and Purpose: *In vitro* methods are available to evaluate the amount and rate of skin absorption of topical products and contribute to their safety and/or efficacy assessments. Excised human skin (EHS) is the 'gold standard' for *in vitro* permeation testing; however, due to [high cost](#) and supply shortages, there is a need to find suitable alternatives as skin barrier models. Previously, we evaluated the performance of a subset of skin models for *in vitro* permeation testing (IVPT) over 6 hours. In this study, we expanded our research by employing automated diffusion equipment with flow-through cells to perform IVPT for 24 hours using commercially available skin models, including an artificial membrane, reconstructed human epidermal and full-thickness models, excised minipig skin, and EHS.

Methods: The reconstructed human skin models [tested](#) included ZenSkin, SkinEthic RHE, EpiDerm-200, and EPI-200-X as epidermal models and T-Skin, EpiDermFT-400, and Phenion-FT as full-thickness models. In addition, the artificial membrane Strat-M and excised minipig skin [were evaluated](#), along with EHS. The cumulative amount (nmol/cm²), flux (nmol/cm²/h), and mass distribution (% of dose) of ¹⁴C-labeled caffeine, salicylic acid, testosterone, and mannitol (dose: 1.0 µL/cm²; 6 nmol/cm²) [were compared](#) between EHS and each alternative skin model using IVPT. Transepithelial water loss (TEWL) and histology [were also compared](#) across models to correlate their barrier function and structure. Furthermore, a method has been developed to isolate the stratum corneum of each biological skin model by trypsin enzymatic digestion (0.5% (w/v) trypsin in PBS at 37 °C), followed by a pilot liquid chromatography-high resolution mass spectrometry (LC/HRMS)-based untargeted lipidomic analysis to examine the stratum corneum lipidome in the alternative skin models and EHS.

Results: The permeation of caffeine and salicylic acid was higher than that of testosterone and mannitol across all skin models. EHS exhibited the lowest average TEWL value, with the TEWL in alternative skin models increasing in the order EHS ≈ minipig ≈ Strat-M < EpiDerm-200-X < EpiDerm-200 ≈ SkinEthic RHE < ZenSkin ≈ T-Skin < EpiDermFT-400 ≈ Phenion-FT. The observed trend of TEWL was generally correlated to the permeation function of the skin models. Histological evaluation showed that each biological skin model had a stratified structure characteristic of the human skin anatomy. Additionally, the stratum corneum [was isolated](#) successfully from each biological skin model. Preliminary lipidomics data [support](#) the feasibility of using a LC/HRMS protocol to characterize the lipid composition of the stratum corneum from both excised and reconstructed skin models and evaluate the correlation with the permeation function of each skin model.

Conclusions: Overall, the TEWL and IVPT data suggest that the reconstructed skin models have a weaker barrier than EHS and minipig skin, although the magnitude of differences varies by model and test compound. The lipidomics data, together with the IVPT, TEWL, and histology data, may help guide further optimization of reconstructed human skin to match the barrier properties of EHS. The systematic comparison of alternative skin models and EHS contributes to the evaluation of the potential use of these models as [new approach](#) methods (NAMs) to predict dermal absorption of FDA-regulated compounds.

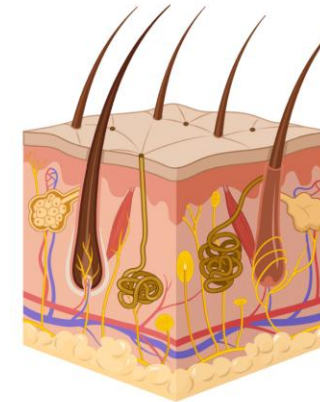
Evaluation and Comparison of In Vitro Permeation Testing (IVPT), Barrier Function, and Lipid Composition in Alternative Skin Models and Excised Human Skin

Sadegh Modaresi, PhD
National Center for Toxicological Research, U.S. Food and Drug Administration, Jefferson, AR

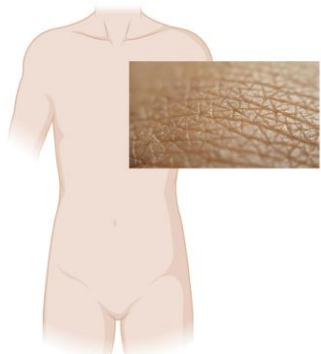
Dermal exposure



Safety assessment



Excised human skin



Limited availability

High biological variability

Supply and logistical limitations



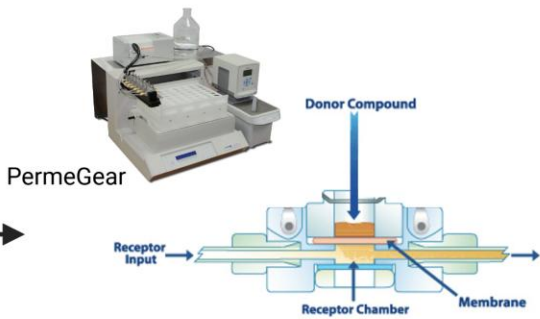
Predictive skin models

Alternative skin models vs. excised human skin

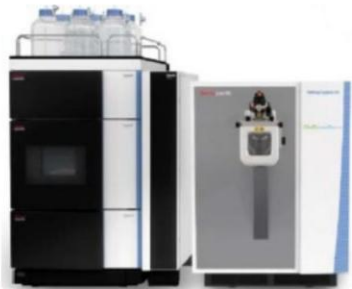
- Reconstructed Human Epidermis
- Full-thickness Skin Equivalents
- Artificial membrane
- Minipig skin



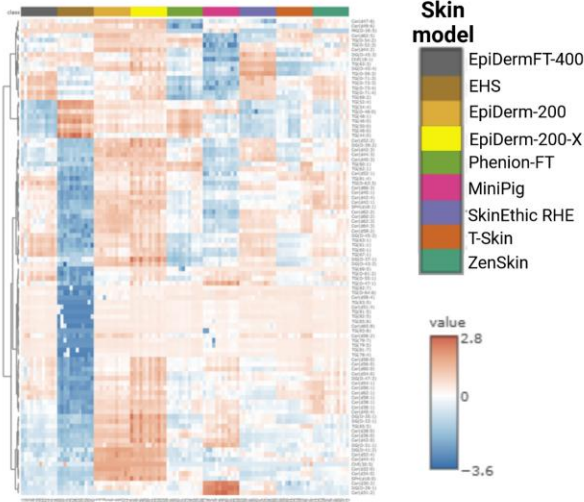
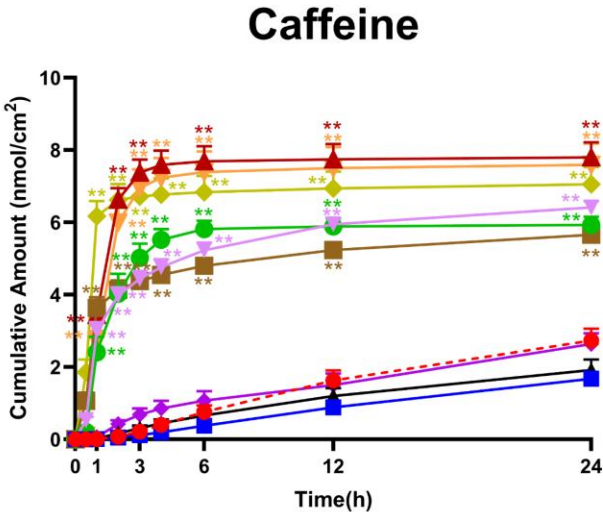
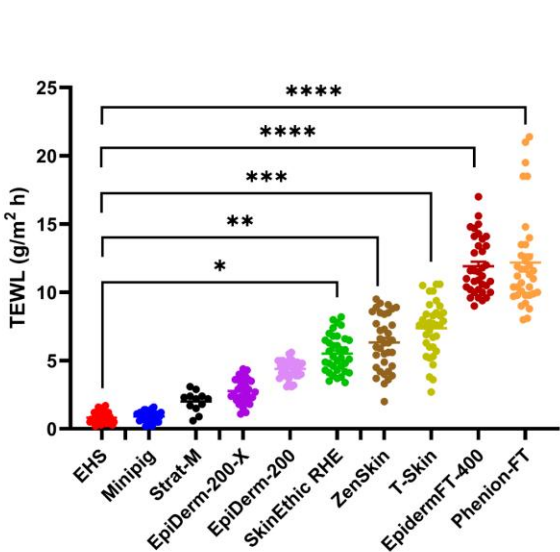
In Vitro Permeation Testing



Lipidomics of Stratum corneum



Waters



Edgewell Personal Care Trainee Travel Award

*In recognition of outstanding Postdoctoral Fellows and
Graduate students for their contribution to dermal
toxicology*

Kevin Ozkuyumcu, PharmD, RPh

Institution: Rutgers University

Title: Sulfur Mustard Disrupts Epidermal and
Dermal Structures in Hairless Guinea Pig Skin

Poster #3245 – E376 Mon. Mar 23rd 9:15-11:45AM



Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin

3245: Poster Board - E376: Monday March 23rd

Background and Purpose: Sulfur mustard (SM; bis(2-chloroethyl) sulfide) is a highly reactive bifunctional alkylating agent and potent vesicant that causes severe damage to the skin. Following dermal exposure, SM induces erythema, inflammation, epidermal erosions, and blistering. In this study, we investigated the temporal progression of SM injury in the hairless guinea pig, a translationally relevant animal model for studying SM-induced cutaneous injury. Hairless guinea pig skin closely resembles human skin, possessing a thick epidermis and a well-developed dermis containing superficial microvessels and secondary appendages. Proteins essential for skin homeostasis were visualized following injury including elastin, a marker of skin elasticity, myeloperoxidase (MPO), a marker of inflammation, and keratin 5 (K5), an epithelial scaffolding protein. The objective of this work was to characterize the pathogenesis of SM-induced skin injury and the subsequent wound-healing responses in the hairless guinea pig.

Methods: Exposures to SM were conducted using a vapor cap model at MRIGlobal (Kansas City, MO) under an IACUC-approved protocol. Air control or saturated SM vapor caps were applied to the dorsal flanks of 6-8 wk-old Hartley hairless guinea pigs for 20 min. Forty-eight hours post-exposure, SM-exposed sites were debrided daily for 4d using saline gauze soaks. Animals were euthanized 2d post-SM (prior to debridement) and at 20d and 66d post-SM exposure. Full-thickness skin biopsies from control and SM-treated animals were collected and processed for histopathology using hematoxylin and eosin (H&E) and Masson's trichrome staining. Elastic fibers were visualized using orcein stain. Immunohistochemistry was performed using antibodies against MPO and K5, with matched IgG controls.

Results: The skin of control hairless guinea pigs displayed a well-developed, multi-layered epidermis overlying a dermis composed of an interwoven collagen network with abundant, branching elastic fibers. Two days post-SM skin was characterized by epidermal necrosis and dermo-epidermal clefts containing numerous necrotic heterophils. In the dermis, perivascular infiltrates and extravasated red blood cells surrounding degenerate vascular endothelial cells were observed. By 20d post-SM, moderate epidermal acanthosis and perivascular vacuolization were noted in the stratum granulosum and stratum spinosum. Elastic fibers within the edematous superficial dermis were fragmented and agglomerated. By 66d post-SM, there was a clear demarcation between the superficial and deep dermis, with the superficial dermis containing dense, highly compacted collagen fibers running parallel to the epidermis, which was devoid of elastic fibers and secondary appendages. MPO, a marker of azurophilic granules in neutrophils, was not expressed within the epidermis of control skin. Two days post-SM, MPO positive degenerate heterophils were observed within the dermo-epidermal cleft and throughout the necrotic epidermis. Epidermal MPO expression had decreased by 20d post-SM and was not evident 66d post-SM. K5, a protein essential for the structural integrity of epithelial cell attachment to the basement membrane, was expressed in basal keratinocytes in control skin. In epithelial cells along the basement membrane, K5 was downregulated 2d post-SM. Twenty days post-SM, K5 expression within the basal layer had returned, approaching control levels by 66d.

Conclusions: SM exposure in hairless guinea pig skin produced a well-defined sequence of injury and repair. Early lesions were characterized by extensive epidermal necrosis, dermo-epidermal separation, and an acute neutrophilic infiltrate, accompanied by vascular damage in the dermis. By 20d post-SM, partial re-epithelialization and remodeling of the epidermis were evident, though dermal elastic fibers remained fragmented and collagen organization was altered. At 66d, the skin exhibited structural remodeling marked by dense, compact collagen deposition with a loss of elastic fibers and adnexal structures, indicative of scar formation. The transient expression of MPO and restoration of K5 confirmed a shift from acute inflammation

to tissue repair and re-establishment of epidermal integrity. Overall, these findings demonstrate a progressive transition from acute injury to chronic dermal remodeling following SM exposure.

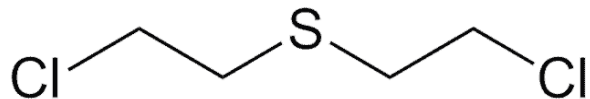


Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin

Kevin Ozkuyumcu, PharmD – Rutgers University

Background

- Used as a chemical warfare agent during WWI
- Used in Syrian Civil War (2015) & Mosul, Iraq (2017)
- Vesicating Agent, DNA Alkylating agent
 - Effects eyes, respiratory tract, and skin
 - Causes 2nd Degree Burns
- **Currently no FDA-approved countermeasures**



Bis(2-chloroethyl) sulfide
Sulfur mustard (SM)

Materials & Methods

- 6-8 week-old Hartley hairless guinea pigs
- SM vapor caps (10μL neat) placed on dorsal flanks for 20 minutes (MRIGlobal, Kansas City, MO)
- Skin was debrided for 4 days with wet-to-wet saline gauze soaks
- Animals were euthanized 2-, 20-, and 66-days post-SM



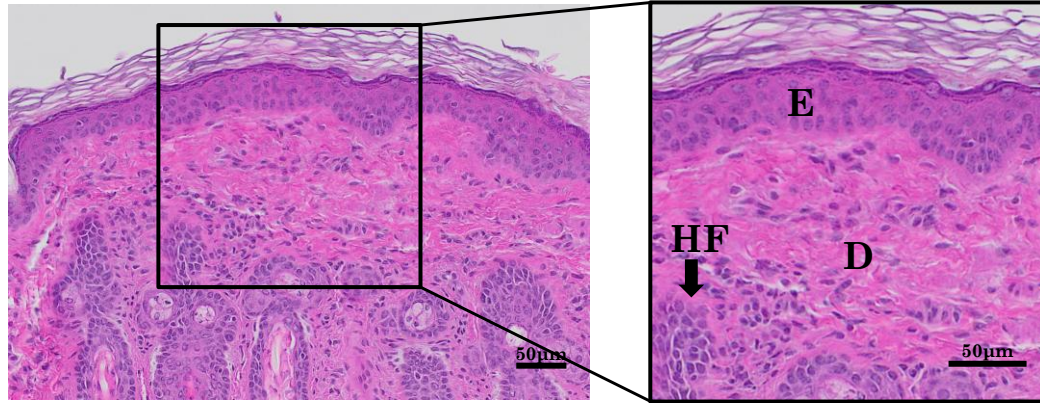
Hartley Hairless
Guinea Pig



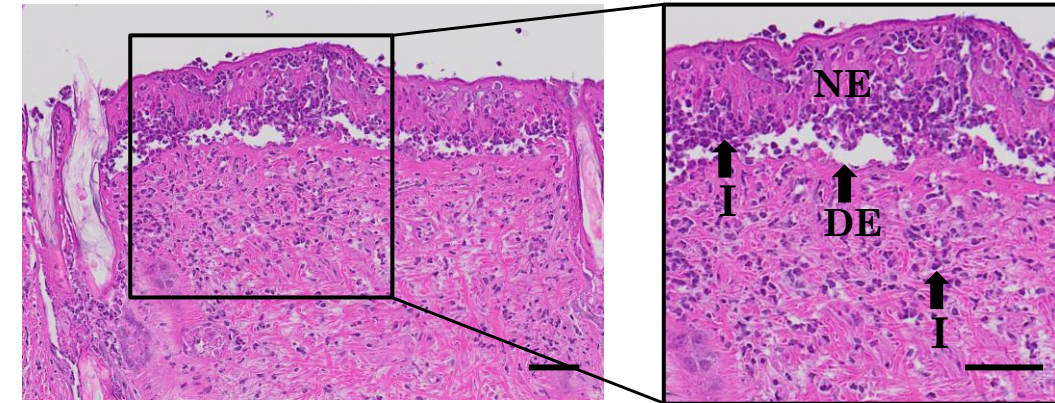
Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin

H&E

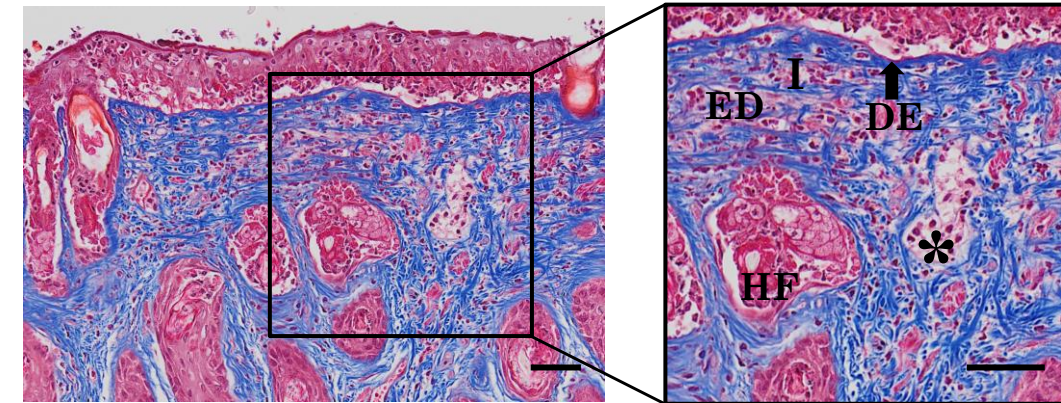
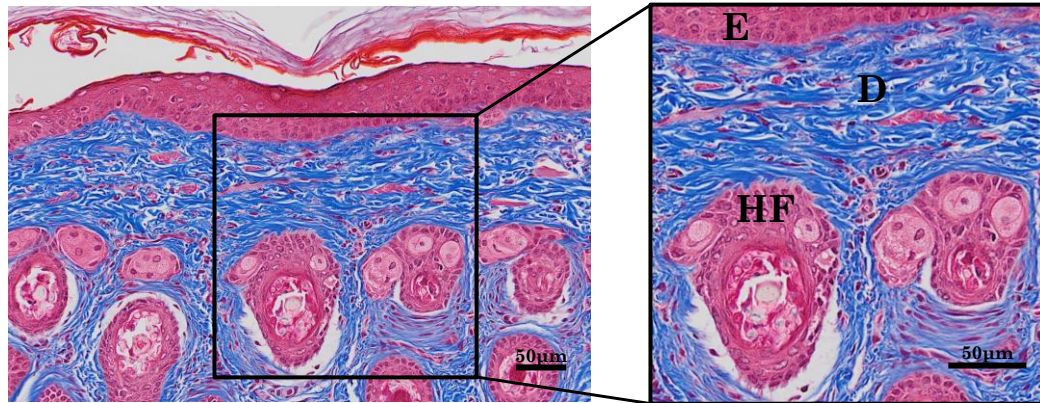
CTL



2d



Trichrome



D, dermis
DE, dermo-epidermal cleft
E, epidermis
ED, edema

HF, hair follicle
I, inflammatory cell infiltrate
NE, neo-epidermis
Asterisk, vascular necrosis

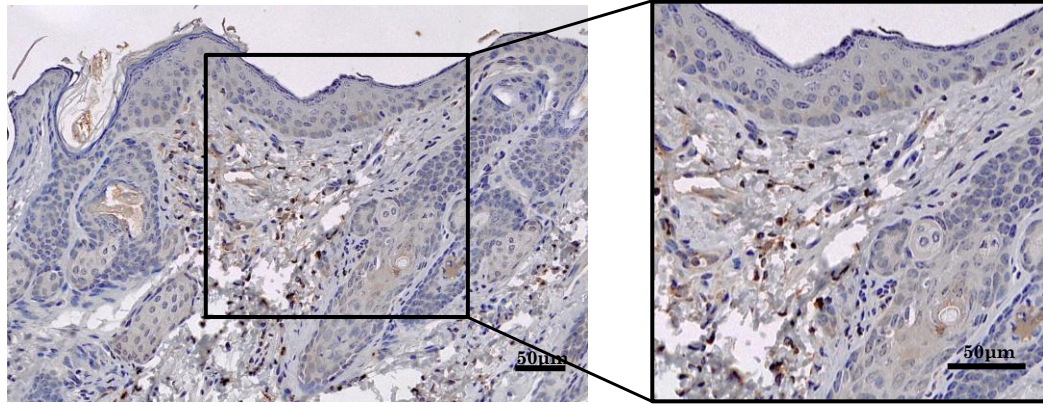
Scale Bar = 50µm



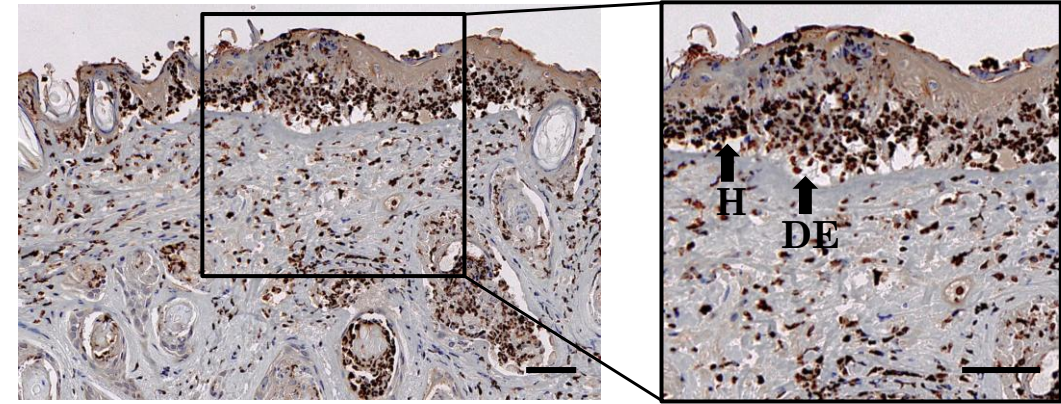
Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin

MPO

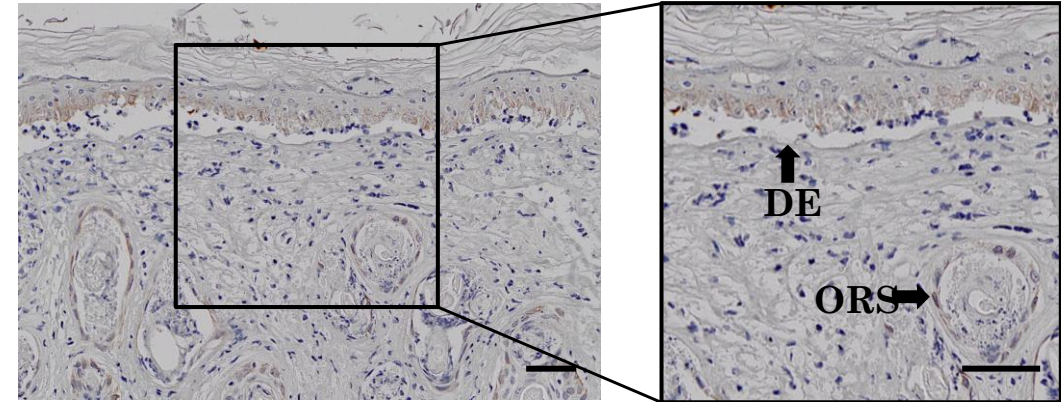
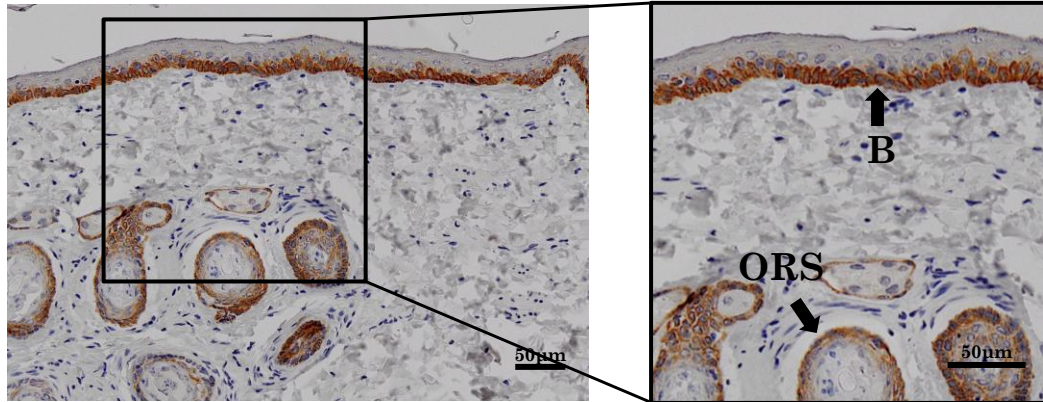
CTL



2d



Keratin 5



B, basal layer

DE, dermo-epidermal cleft

ORS, outer root sheath of the hair follicle

H, heterophil infiltration

Scale Bar = 50µm



Sulfur Mustard Disrupts Epidermal and Dermal Structures in Hairless Guinea Pig Skin

Conclusions

- A single exposure to sulfur mustard disrupts normal skin integrity, causing epidermal cell death, inflammatory cell infiltration, dermal-epidermal separation, and degradation of dermal tissue.
- These pathological changes lead to significant impairment of skin structure and wound healing processes.
- Improved understanding of the mechanisms regulating cutaneous injury and repair are critical for developing effective therapeutic countermeasures against vesicant exposure.

Acknowledgments

- Dr. Jeffrey D. Laskin
- Dr. Laurie B. Joseph
- Dr. Daniel Weinstock
- Dr. Peihong Zhou
- Dr. Claire R. Croutch
- MRIGlobal
- NIH CounterACT Program
- Funding:
 - NIH T32ES007148
 - NIH AR055073
 - NIH ES020721
 - HHS O100201300019C

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SOT 65TH ANNUAL MEETING AND TOXEXPO

Isabelle Lee, PhD

Principal Scientist,
Dermatotoxicology

ilee@rifm.org



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non-profit scientific
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established in 1966

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ingredients through our
internationally recognized
Safety Assessment and
Research Programs.



VISION



MISSION



CORE VALUES



RIFM's leadership in state-of-the-art science enables the enjoyment of fragrances around the world.

RIFM science and research builds international trust in and acceptance of the safe use of fragrance materials.

- Scientific Excellence, Objectivity, Integrity, and Leadership
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- NEW APPROACH METHODS
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- MATERIAL COMPOSITION
- RISK ASSESMENT RESEARCH

The Research Institutes of Fragrance Materials Trainee Travel Award

In recognition of outstanding Postdoctoral Fellows and Graduate students for their contribution to New Approach Methodologies (NAMs), exposure science, material composition, dermal/skin risk assessment

Catalina Gaviria, Ph.D.

Institution: Wake Forest Institute for Regenerative Medicine

Title: *Human skin equivalents reveal multiple cell death modes in mustard agent-induced dermal injury*

Human skin equivalents reveal multiple cell death modes in mustard agent-induced dermal injury

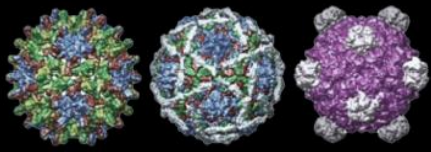
3262: Poster Board - E394: Monday March 23rd

Background and Purpose: Chemical warfare agents represent a major global health concern due to their high morbidity and mortality. Particularly, mustard agents pose a particularly serious public health threat, as they can be easily produced, cause severe injury and lack effective medical countermeasures. While apoptosis and necrosis are known mustard-induced cell death pathways, the involvement of other modes of cell death, such as parthanatos, pyroptosis, necroptosis, and ferroptosis, remains largely unexplored. Understanding these diverse cell death modes could reveal new options for therapeutic intervention; however, progress has been limited by the lack of physiologically relevant human skin models. To address this limitation, we developed a three-dimensional human skin equivalent (HSE) that accurately replicates human skin biology and enables the study of vesicant-induced injury and cell death mechanisms.

Methods: HSEs consisted of a stratified epidermis of keratinocytes overlying a dermal compartment containing fibroblasts, adipocytes, and endothelial cells. To evaluate their suitability for studying the toxic effects of vesicants, we established a novel method for exposing HSEs to sulfur and nitrogen mustard vapors, reproducing the likely route of exposure during a chemical attack. Histological and genotoxic markers of cellular injury were analyzed as well as the activation of specific cell death pathways over time.

Results: HSEs faithfully recapitulated key structural and functional characteristics of human skin, including epidermal stratification, stromal complexity, and spontaneous vasculogenesis. Upon exposure to mustard agents, HSEs exhibited dose-dependent vesication, an effect rarely observed in animal models, as well as DNA damage, as indicated by H2A.X staining. Time-course analyses revealed immunohistochemical evidence for the activation of multiple cell death pathways, including apoptosis, parthanatos, pyroptosis, necroptosis and ferroptosis. These findings were confirmed by immunohistochemistry, TUNEL staining, adenylate kinase release and qPCR analysis.

Conclusions: Our findings support the use of HSEs as robust and physiologically relevant platform for studying skin pathogenesis of vesicant exposure. HSEs exhibited dose-dependent injury responses consistent with human pathology while revealing the involvement of diverse cell death pathways, offering potential targets for therapeutic development. By incorporating multiple cell types, these models provide a more authentic representation of the complex host responses to vesicant agents. Collectively, our results highlight HSEs as an innovative new approach methodology to reduce the use of animals for studying mechanisms of vesicant injury and screening medical countermeasures. It is anticipated that HSEs will make substantial contributions to the fundamental understanding and treatment of toxicological insults in human skin.



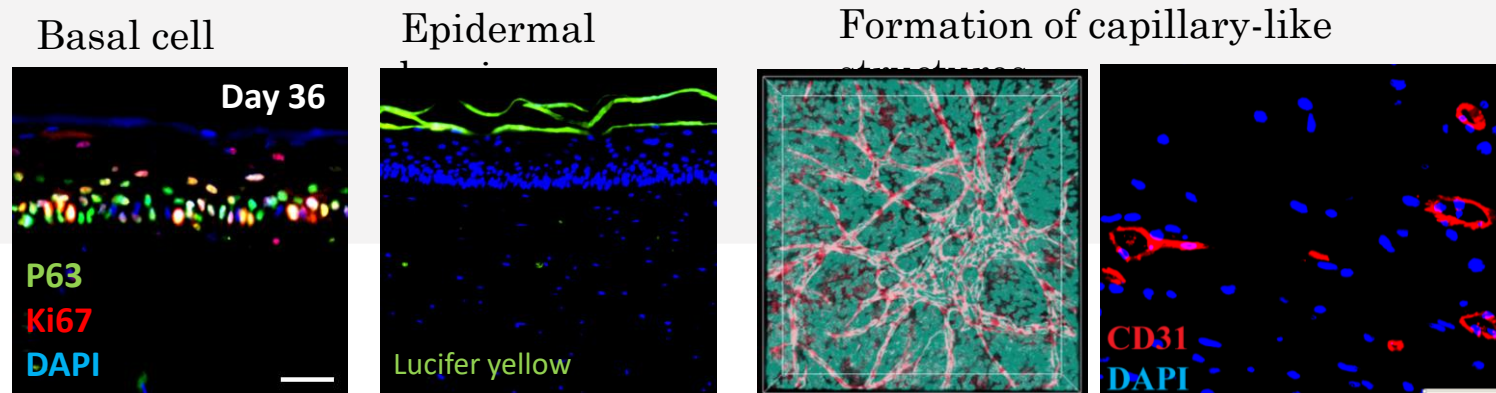
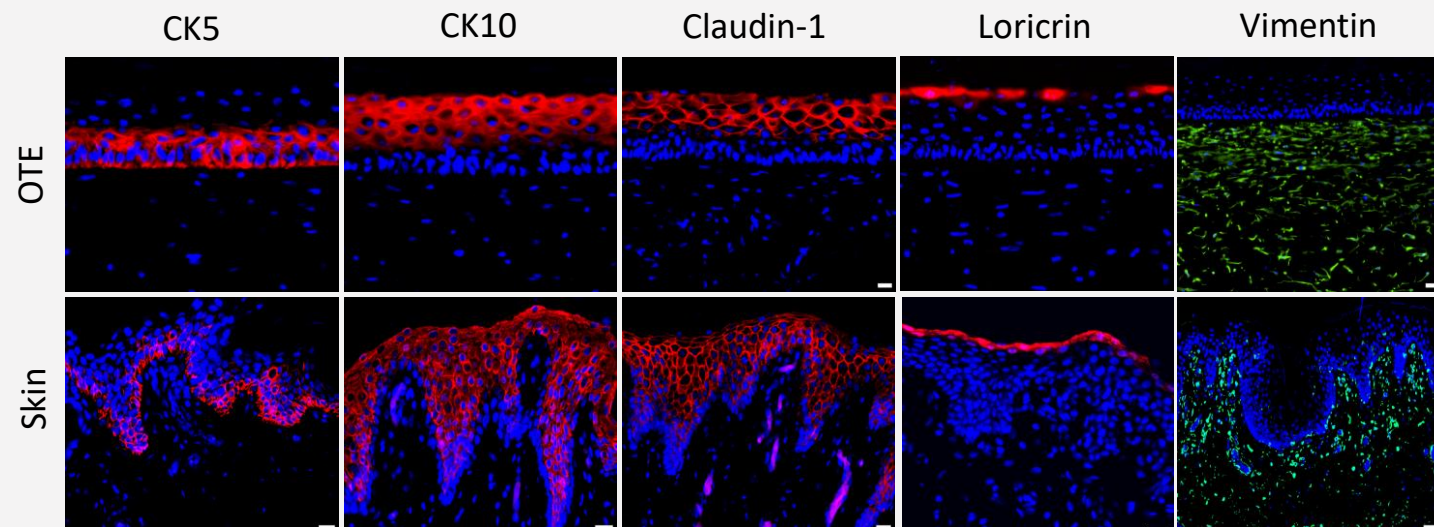
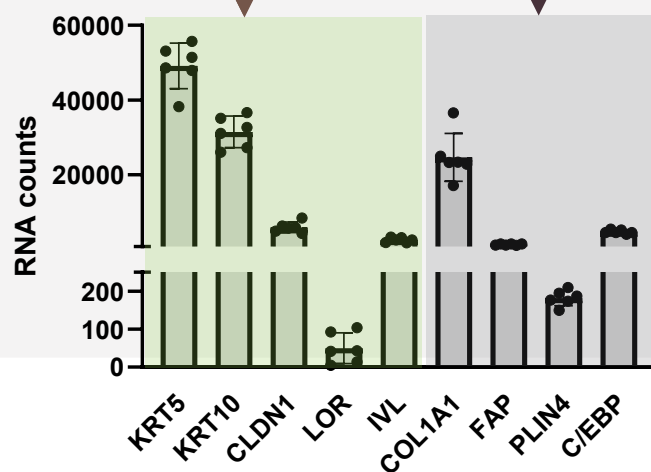
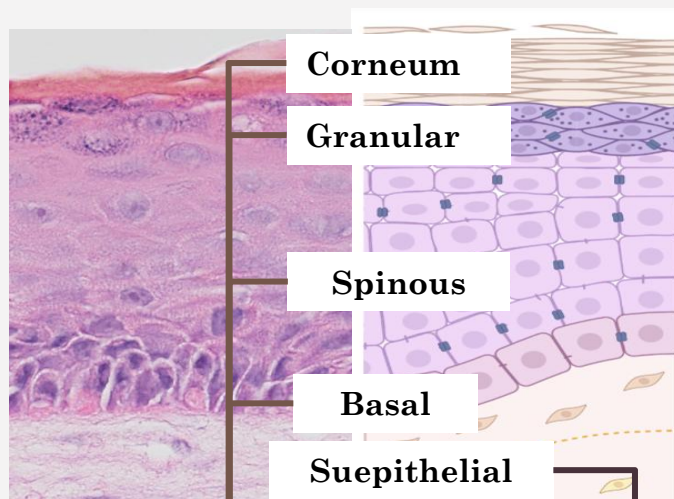
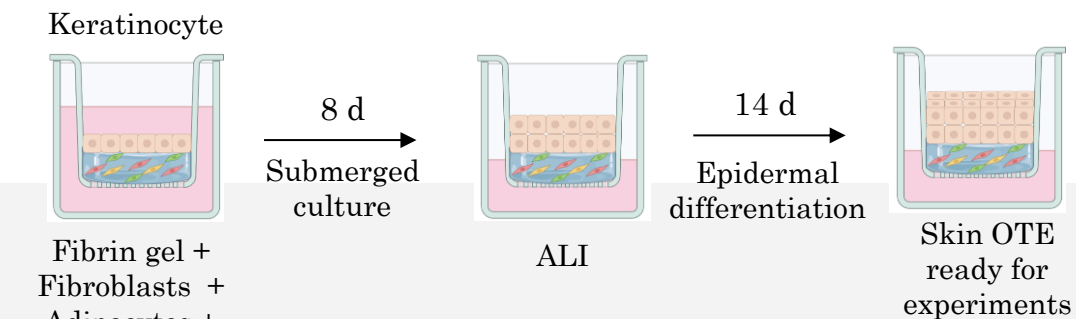
Multicellular human skin equivalents to study mustard agent dermal injury

Catalina Gaviria

Wake Forest Institute for Regenerative Medicine

Wake Forest University School of Medicine

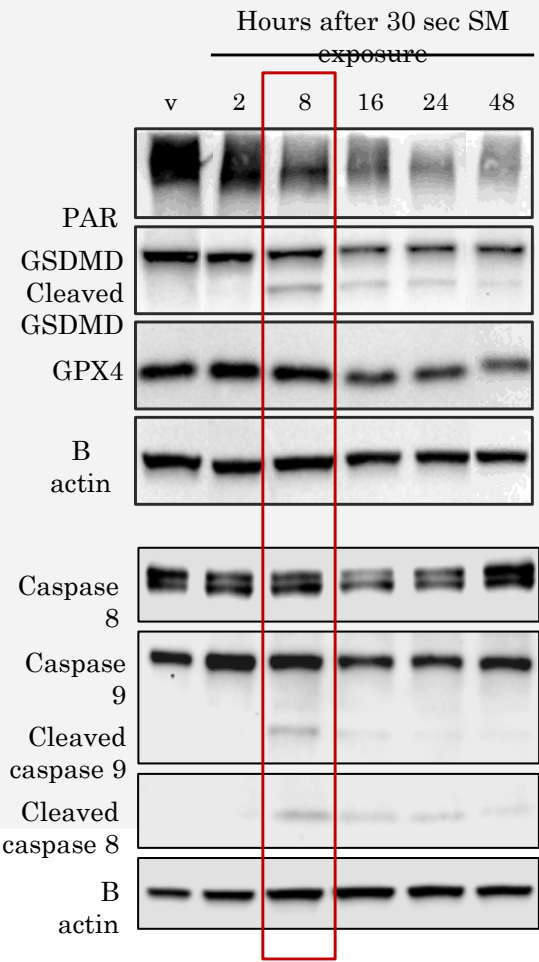
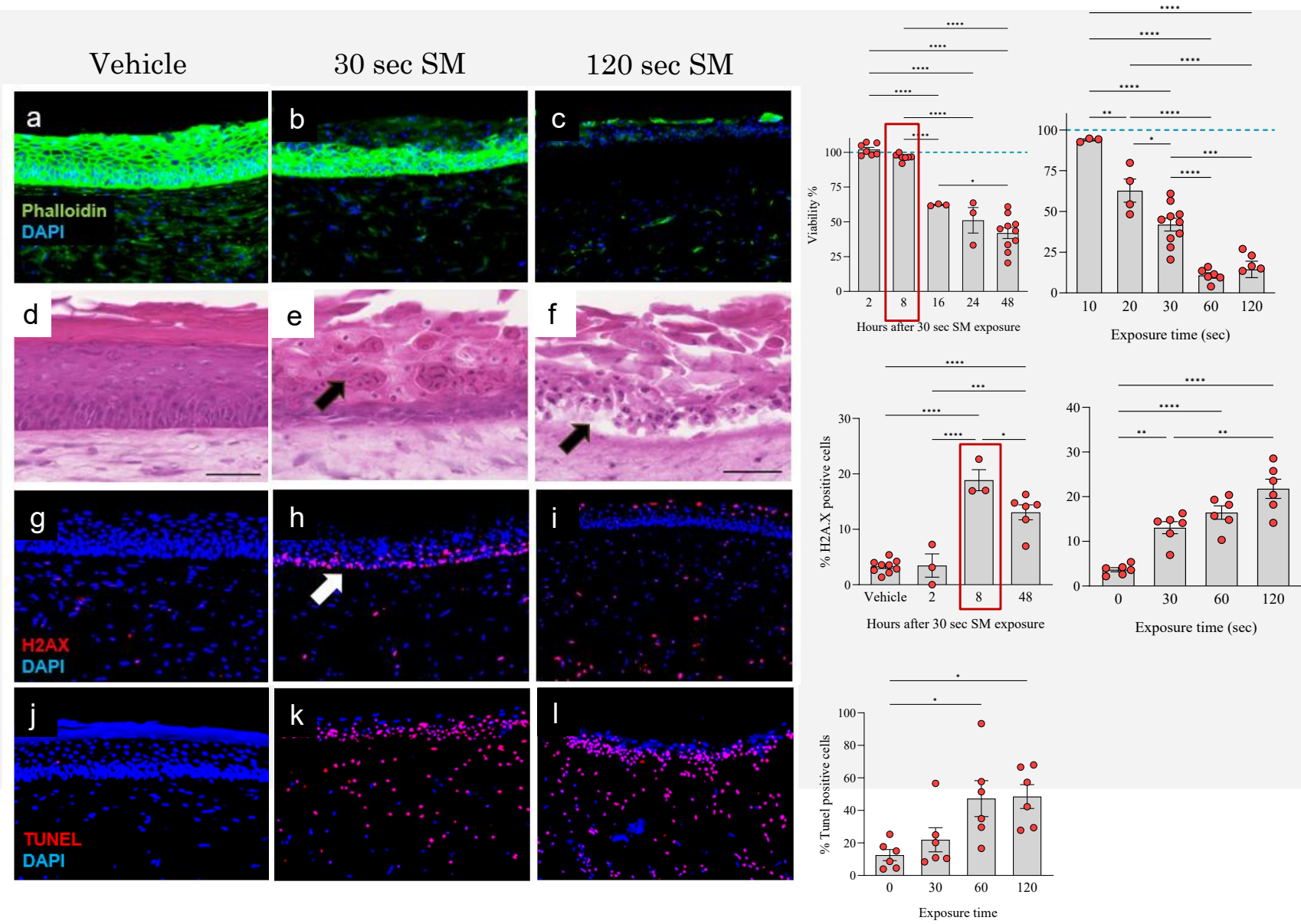
DEVELOPMENT OF A 3D HUMAN SKIN MODEL (SKIN OTE)

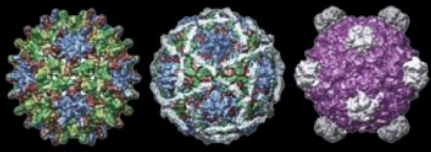


HSEs recapitulate host responses to sulfur mustard and exhibit injury patterns consistent with human pathology

Intrinsic apoptosis is potentially the predominant response, facilitated by the inhibition of parthanatos and pyroptosis

Viability
Histology
DNA damage
Apoptosis





Cellular and Molecular Virology
PI: Patrick McNutt
Wake Forest Institute for Regenerative Medicine



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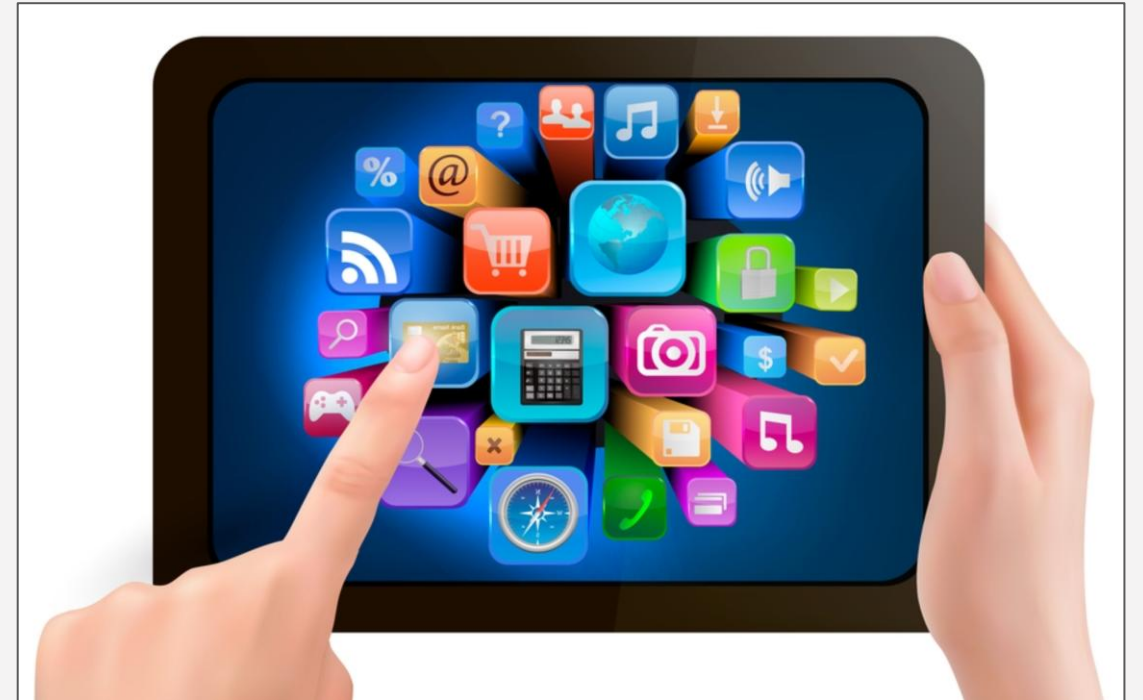


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George DeGeorge, PhD, DABT, ERT, ATS
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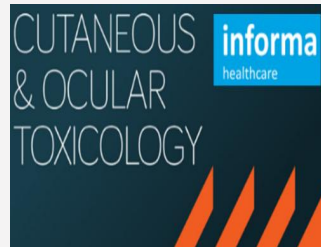
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