2025 | VOLUME 49 | ISSUE 4

TOXTALK

PRESIDENT'S MESSAGE

Chris Heartsill, B.S., D-ABFT-FT
2025 SOFT President

SCATTER SHOOTING AS I REFLECT ON MY LAST MESSAGE.

As I am writing this final letter to you as SOFT President, it is a very early morning on an unnamed day somewhere over an unnamed ocean just south of the equator. I am confident they both have names but in the fog of overnight travel I don't have the wherewithal to make that determination. Landmasses with exotic names are showing up on my flight information screen. Places like Raroton-ga, Tauhunu, and Avao. My little boy brain immediately goes to scenarios of survival on a deserted island somewhere in a lost ocean. How would I get water, food, shelter, wifi, you know, the basics. I will attend my first non-joint TIAFT meeting in New Zealand and I could not be more excited. But writing this, I struggle for what to say, what topic to touch on and somehow weave a thread of SOFT through it. Music…. Done that. Grat-itude…. Sorta done that too. Ah, the future... nope. Seasons, there we go, I'll do the seasons… that was issue 2.

I do not have time to send out a survey to see what you would want to read about so I will do the Johnny Carson Carnac routine and mindread what you want to see. It is at this moment that some people are smiling, some are googling, and some have a giant question mark above their furrowed brow. I don't consider myself old, but my parents are getting up there and I have the benefit of dipping into their world and experiences when I need to call on a situation. But that does bring up a good question: what do you want to see in ToxTalk? Are there improvements that we can make? The Editors and the Office are discussing how and when ToxTalk will be published and if there are ways to improve content and delivery. Each issue is filled with exciting news about the An-nual Meeting, exhilarating and Pulitzer worthy articles from your President, Committee updates and reports, and scientific articles. All of these are certainly publication worthy, but could it be arranged in a way to better provide you this information? Perhaps. Let me know if you have thoughts on that, I would love to hear your feedback.

A consistent vein in President's last letter of the year are reflections of the year, accom-plishments throughout SOFT, predictions for the future, and a hearty thank everyone

INSIDE THIS ISSUE

PRESIDENT'S MESSAGE CONTINUED

with names of meeting hosts, staff, and you the membership. And in that vein, I am truly grateful for all those individuals who make things happen. As reported at the Annual Business Meeting, we have over 200 SOFT members participating in over 20 committees. That is a huge number and SOFT is doing everything it can to get you involved. The amount of desire and effort from this membership is truly remarkable. The annual Committee Update Meeting (available to all to attend) was recently held with the Committee Chairs providing their activity updates for the year. The amazing and wonderful thing is that every single committee submitted their reports on time without much effort from the SOFT Office demonstrating the level of commitment and effort that is now reflected in their activity. So, from the bottom of my sleepy heart, thank you SOFT membership for your continued passion and desire to be involved and move SOFT forward.

Time travel is real. When we land in Auckland, we will be 19 hours ahead of our loved ones back in the central time zone. We will have transitioned from fall to spring but what is more exciting is the transition from Texas to The Shire! The world is an amazing place and having the opportunity to experience it is something I do not take for granted. Perhaps the most beneficial thing you can do to expand your mind is traveling. Experiencing new people, their cultures, their lifestyles and coming to the realization that they are just like you. No matter where you go, there you are. A reflection of your needs and wants coming back to you from the people you meet. But you don't have to go across an ocean to have these experiences. You can find them in your neighborhood, in your city, and in your society. Especially this Society. SOFT would not be SOFT without its membership (and sponsors, never forget their contributions). The diversity within SOFT offers us the opportunity to experience different cultures without having to go all the way around the world and I love that! Lean into it and take the time to soak up those non-scientific opportunities for growth when you are working within SOFT or attending a meeting.

As I end this letter, traveling at 554 mph, 40000 feet, -76 degrees F, and heading to my survival island of Nuku' Alofa, I must make the mandatory discussion of accomplishments, predictions, and thanks. SOFT has done a lot this past year as it does every year. The operation of SOFT today is more efficient, inclusive, and dynamic than it has ever been. Beth Olson is proud of and passionate about this organization and often brags about it to others in her similar role. But she is to be commended on her constantly evolving ideas to make us better. The talent in the membership is remarkable and the future is certainly in great hands. The thank you's are endless. I want to thank the Board of Directors (BOD), past and present, for their support, feedback, wisdom, and at times challenges. It is truly a remarkable group of passionate scientists working hard to make this Society the best it can be. I want to thank my good friends Amy Miles and Sara Short, the 2025 Annual Meeting hosts. The amount of work they put forward to ensure you had a safe and wonderful time in Portland may have been unseen by most, but I saw it and I appreciate it. The final thank you is twofold, obviously you, the membership, for being so great and making this Society one of the best organizations in the world. For the other I would like to focus on a specific role that is played within SOFT. Each year the incoming president appoints a counselor to the BOD. This person is typically a Past President that can bring historical perspective to decisions and advise the BOD s they navigate the operation of SOFT. This role has brought a richness to the BOD that cannot be emphasized enough. I had the distinct privilege of appointing Dan Anderson and serving with previously appointed Laurel Farrel. The wisdom, thoughtfulness, support…. all of the positive and supporting adjectives, that they bring to the table is amazing. They add a perspective to the Board that otherwise would be missing. If you have a chance to thank them or any other counselor for the many years of service they have provided to SOFT, make sure you take a moment do that. Thank you, Dan and Laurel, from the bottom of my heart.

I must put away all large electronic devices at this point and prepare for landing (and hit the bathroom before the line starts). I am so honored for the opportunity to have served SOFT as its 2025 President but what that really means is that I am honored that you put your trust in me to keep us moving. I will forever be in debt to the trust you put in me and am ready to be of service to you and SOFT in any way that is needed. Kia ora, gracias, merci, doumo arigatou, xiexie, danke, gratze, toda, thank you!

Chris Heartsill

HAPPY HOLIDAYS!

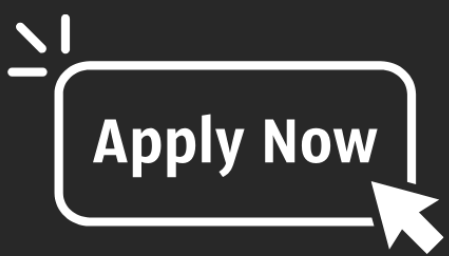
Join SOFT: Membership & Promotions

The Society of Forensic Toxicologists (SOFT) offers several categories of membership to support individuals at all stages of their careers in forensic toxicology. Whether you are a student exploring the field, an experienced professional, or a long-time member transitioning into retirement, there is a membership type tailored to your background and level of involvement.

Each category has specific eligibility requirements, benefits, and sponsorship guidelines. Please review the details below to determine the membership type that best fits your qualifications and professional status. If you are a current member seeking to update your membership category, information about membership promotion is also provided.

Please feel free to reach out to the Membership Committee with any questions or if you need assistance with your Membership Application.

MEMBERSHIP COMMITTEE
Chair: Madeleine Swortwood
Sarah Martin
Justin Grodnitzky
Marissa Finkelstein



How to Apply for SOFT Membership

BECOME A MEMBER TODAY!

STEP 01
Select your Membership Level

Determine the level you qualify for or wish to promote to. Review the requirements and sponsorship needs.

STEP 02
Contact Your Sponsor

Reach out to your sponsors and request they submit a Sponsorship Form for your application.

STEP 03
Create Your Profile & Pay

Create your Membership Profile & Submit your Application Fee - Applied to first-year dues upon approval.

STEP 04
Submit Your Application

Submit your Membership Application with the following:

- Current CV or Resume
- Completed Sponsorship Form (PDF received via email)

CONTINUING EDUCATION OPPORTUNITIES

Unlock a treasure trove of knowledge with our live and on-demand webinars, designed for forensic toxicologists at every stage of their career. Whether you're a seasoned professional or just starting out, these sessions are crafted to enrich your understanding of cutting-edge topics and industry challenges.

SOFT Learning Center Offers:

- **EXCLUSIVE ACCESS**
- **AFFORDABLE LEARNING**
- **ON-DEMAND FLEXIBILITY**

ACCESS THE LEARNING CENTER!

ANNUAL MEETING RECAP - PORTLAND, OR

THANK YOU FROM THE 2025 SOFT ANNUAL MEETING HOSTS!

What an incredible week in Portland! From start to finish, the Society of Forensic Toxicologists meeting was packed with energy, innovation, and collaboration. We were thrilled to welcome so many colleagues to the Pacific Northwest for a meeting that truly showcased the best of our field.

The scientific content this year was outstanding. Workshops and scientific sessions delivered cutting-edge research, practical applications, and thought-provoking discussions that will shape forensic toxicology for years to come. The engagement and enthusiasm from attendees made every session feel dynamic and impactful. The quality and depth of the content reflected the dedication and expertise of our presenters and participants, and we are grateful for the engagement that made these sessions so impactful.

We would also like to recognize the exhibitors, whose generous support made it possible to provide the food and beverage breaks, the dessert and drinks at the Elmer Gordon Forum, the ever-famous Nite Owl, and so many other wonderful perks that enhance the SOFT experience. The Oregon Convention Center offered ample space for attendees to connect with exhibitors, explore the latest technology, and learn about innovative solutions shaping the future of forensic toxicology.

Of course, we couldn't resist adding a little Portland flair! During the Wednesday night out event the AWOL aerialists wowed us all with their breathtaking performances, creating unforgettable moments that blended art and science in a way only SOFT can.

Although it was a chilly morning, the Fun Run went off smoothly and everyone enjoyed the course. It was a lovely, crisp morning to run or walk along the Willamette River and take in the views from the running route.

A huge thank you goes to our Planning Committee for their tireless work behind the scenes. Your dedication ensured a smooth, successful, and memorable meeting. We also want to give special recognition to Beth Olson and her family, whose integral support and hospitality made everything run seamlessly. Their efforts were truly the backbone of this event.

To everyone who attended, presented, and contributed, thank you for making SOFT 2025 in Portland a resounding success. We can't wait to see you next year!

Amy Miles

Sara Short

OREGON CONVENTION CENTER
OCTOBER 26 – 31, 2025

PLANNING COMMITTEE

HOST
SARA SHORT

HOST
AMY MILES

Scientific Program Coordinators
Kayla Neuman - WI State Lab of Hygiene
Tyson Baird - Sedgewick Co Regional Forensic Science Center

Workshop Program Coordinators
Mary Lynn Heffington - Arkansas State Crime Lab
Dani Mata - Orange Co Crime Lab

Volunteer Coordinators
Chelsea VanDenBurg - Oregon State Police Lab
Brianna Lehr - Oregon State Police Lab
Dawn Sklerov - Washington State Patrol Toxicology Lab

Food & Beverage Coordinators
Ann Marie Gordon - Consultant
Denice Teem - Oakland County ME's Office
Delisa Downey - Virginian Dept. of Forensic Science

Mobile Application Coordinators
Rusty Lewis - Federal Aviation Administration
Roxane Ritter - Federal Aviation Administration
Sunday Hickerson - Federal Aviation Administration

Audio Visual Coordinator
Frank Wallace - Wallace Consulting Solutions

Young Forensic Toxicologists Chair
Elisa Shoff - Miami-Dade ME's Office

JAT Special Issue Editor
Rebecca Wagner - Virginia Dept. of Forensic Science

Fun Run Coordinator
Shannon Palladino - Oregon State Police Lab

Exhibitor Liaison
Sarah Riley - St. Louis University School of Medicine


Megan
Full Meeting
Jasmine
Diaz
Full Meeting
MEMBER
Amanda
Full Meeting
MEMBER
Rachael
Full Meeting
she · her


Claudia
Alain
Full Meeting
NEW MEMBER
MENTEE
Lindsay
Full Meeting
MEMBER
ABFT

ANNUAL MEETING RECAP - PORTLAND, OR

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2025 AWARD RECIPIENTS

EDIT AWARD

AWARD RECIPIENT: AMANDA PACANA

Title: “A Novel Screening Workflow for Nitazine Analogs Using LCMS/MS Precursor Ion Scan Acquisition”
Affiliation: Sam Houston State University

EDUCATIONAL RESEARCH AWARD (ERA) AWARD RECIPIENTS

AWARD RECIPIENT: SEOKJIN HWANG

Title: “Fast & Forensic: Rapid Detection & Quantitation of 30 Emerging Novel Psychoactive Substances in Hair”
Affiliation: John Jay College of Criminal Justice

AWARD RECIPIENT: MARIA SARKISIAN

Title: “Characterization and Optimization of Identification Criteria for Routine LC-QTOF-MS Targeted Analysis”
Affiliation: Oklahoma State University

AWARD RECIPIENT: MARCO BALLOTARI

Title: “Analysis of Cannabinoids and Semi-synthetic Cannabinoids in Authentic Breastmilk by LC-Tandem Mass Spectrometry”
Affiliation: The University of Florida

YOUNG SCIENTIST MEETING AWARD (YSMA) RECIPIENT

AWARD RECIPIENT: NICHOLAS KHOROZOV

Title: “Synthetic Cannabinoid Quantification on Infused Paper from Prisons by Liquid Chromatography Tandem Mass Spectrometry”
Affiliation: Center for Forensic Research and Education (CFSRE)

LEO DAL CORTIVO AWARD RECIPIENTS

BEST PLATFORM AWARD RECIPIENT: ALAINA HOLT

Title: “Lipid Lifeboats: Capturing Fentanyl with Bioengineered Liposomes”
Affiliation: Virginia Commonwealth University

BEST POSTER AWARD RECIPIENT: KATYA BELTRAN

Title: “Assessing the Long-Term Stability of Synthetic Cannabinoids in Human Blood by LC-QQQ-MS”
Affiliation: CFSRE and Thomas Jefferson University

2025 AWARD RECIPIENTS

ANNUAL SOFT AWARD RECIPIENTS

YOUNG FORENSIC TOXICOLOGISTS SERVICE AWARD RECIPIENT: JOE KAHL

This annual award recognizes a young member of SOFT (≤40 years old) for exceptional service to the organization. The recipient of the award must demonstrate excellence in service and leadership.

TEACHING AND MENTORING AWARD RECIPIENT: ROBERT KRONSTRAND

This annual award recognizes a member of SOFT who is actively teaching and/or mentoring students and other persons in the field of forensic toxicology. This recipient of the award can be an academic or a non-academic practitioner. The measure of mentorship must be articulated by a letter of reference provided by one or more of the individuals mentored.

RESEARCH AWARD RECIPIENT: SVANTE VIKINGSSON

This annual award recognizes a member of SOFT whose contemporary, peer-reviewed scientific research has made a significant impact on the knowledge and practice of forensic toxicology.

DISTINGUISHED SERVICE AWARD RECIPIENT: MARILYN HUESTIS

This annual award recognizes a member of SOFT who has provided exemplary service to the Society of Forensic Toxicologists in a manner that was sustained in time and effort.


The Society of Forensic Toxicologists
Amanda L. Pacana
Full Meeting
MEMBER
The Society of Forensic Toxicologists
Seokjin Hwang
The Society of Forensic Toxicologists
Maria Sarkisian
Student
SPEAKER
The Society of Forensic Toxicologists
Marco Ballotari
Full Meeting
SPEAKER
AWARD RECIPIENT
MEMBER


The Society of Forensic Toxicologists
PRESENTS
Nicholas Khorozov
YOUNG SCIENTIST MENTEE AWARD
FOR THE RESEARCH:


Full Meeting
MEMBER
ABFT
MENTOR
COMMITTEE MEMBER


Robert
MENTOR


SPEAKER
40 YEAR MEMBER
my pronouns are
she - her


WS 12: Curt E. Harper, Ph.D. and Mandi Mohr, MS
WS 13: Robert Johnson, PhD and Kei Osawa, MFS
WS 14: Craig N Chatterton, PhD and Luke N Rodda, Ph
WS 15: Alex J Krotulski, PhD and Paul Wax, MD
WS 16: Lynn M Wagner, PhD and Erin R Wilfong, PhD
EXIT
EXIT


Bill
Johnson

ANNUAL MEETING RECAP - PORTLAND, OR

SOFT 2025 EXHIBITORS & SPONSORS

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RANDOX TOXICOLOGY

UTAK

SOFT 2025 EXHIBITORS & SPONSORS

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EQUIPNET, INC

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KURA BIOTECH

LIN-ZHI INTERNATIONAL, INC.

TIER V SPONSOR

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DPX Technologies, Inc.
Forensic Advantage Systems
Indigo BioAutomation
ionBench Corporation
LGC StandardS
LNI Swissgas
MilliporeSigma
Peak Scientific
Phytronix Technologies Inc.
Rudolph Research Analytical
Shimadzu Scientific Instruments Inc.
Tecan
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Versaterm

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Bruker Scientific LLC
Collaborative Testing Services
DrugImpairment.com
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Innovative Lab Services
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Lighthouse Lab Services
Medix Biochemica
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Peeke Scientific
Randox Toxicology
SCAT Americas, Inc.
Siemens Healthineers
Thermo Fisher Scientific
UTAK Laboratories, Inc.
VICI DBS

Absolute Standards, Inc.
American Toxicology Products
AXIOM DIAGNOSTICS, Inc.
Campbell Science
Diamond Diagnostics
EquipNet, Inc.
IMCS
INTEGRA Biosciences
Kura Biotech
Lin-Zhi International, Inc.
Mercedes Scientific
NMS Labs/CFSRE
Phenomenex Inc.
Restek
SCIEX
SOFT-TIAFT 2026
UCT
Validity Diagnostics
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THANK YOU to our generous sponsors! Your partnership helps us enhance the attendee experience, provide valuable programming, and continue fostering connections within the forensic toxicology community. We truly appreciate your commitment and look forward to our continued relationship.

FUN RUN/WALK SPONSOR

KARLA MOORE MEMORIAL FUN RUN/WALK

Memorial Donation:

A cherished SOFT tradition, the Karla Moore Memorial Fun Run/Walk honors the legacy of Fun Run founder Dr. Karla Moore and supports the American Cancer Society. Participation in the 2025 event was incredible with 130 registrants for the run/walk. The total funding raised was $3900.00 donated to the American Cancer Society. Thank you to all who participated and made this event possible.

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

1. Call to Order by President Heartsill at 3:31 pm Pacific Chris Heartsill
    a. A quorum was established and reported to President Heartsill.

2. Approval of Agenda Chris Heartsill
    a. Motion to approve (Robert Sears); Second (Teresa Gray); APPROVED.

3. Approval of 2024 Annual Business Meeting Minutes Chris Heartsill
    a. Motion to approve (Dwain Fuller); Second (Marilyn Huestis); APPROVED.

4. President's Report Chris Heartsill

    a. President Heartsill thanked everyone for their attendance and reported that SOFT and the BOD had a very busy year. He shared, in picture form, all the travel locations that he and the SOFT gavel visited this year. He reported that the meeting was going smoothly and he thanked the meeting hosts, Planning Committee, F&B, and AV for their efforts in a successful meeting. He also discussed his gratitude for the membership, Board, and Beth. He discussed several highlights of the past year, including: 1) completion of the Employee Handbook, 2) launch of ToxHub, 3) new membership application process, and 4) digital sign-in for the business meeting by QR code linking to a JotForm. He did report that there was a fraudulent check attempt on one of our accounts early in the year and it has been rectified. President Heartsill also reported that we have continued with diversification of the SOFT committee membership and reminded members to stay involved and apply if you are interested in serving. He reiterated the ways to participate in SOFT, including attendance at the open, virtual committee meetings and the committee update meeting coming up in December.

    b. President Heartsill addressed recent posts on social media. For transparency, he clarified a factual timeline of events and SOFT's actions. In February 2022, SOFT was made aware of unwanted text messages from a SOFT member. In March 2022, the Board asked this individual to step down as meeting host. By June 2022, this individual had no further activities related to SOFT. In December 2022, SOFT was made aware that personal communication continued and, as SOFT's current policies did not address this type of concern, SOFT sought the assistance of a third-party investigator (Paula Brantner, Accountability Ignited). This third-party evaluation concluded with the recommendation of permanent revocation of membership. This recommendation was affirmed by the Ethics Committee, Executive Committee, and the Board. In June 2024, the member permanently separated from SOFT. This was reported by President Yeatman at last year's business meeting and it was reflected in the meeting minutes published in ToxTalk. The entire process ensured confidentiality. SOFT now has processes and policies in place, including the Code of Conduct, in addition to the Code of Ethics. Moreover, he reiterated that this was the third annual meeting that was supported by a contract with the company, Accountability Ignited.

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

5. Executive Director's Report Beth Olson

    a. ED Olson welcomed everyone to the meeting. She discussed several updates and initiatives. 1) SOFT Community Survey – This was executed this fall and the Board reviewed the initial report. The full report and findings will be published in a future issue of ToxTalk. We are proud to report that SOFT received the highest satisfaction score that the company (DeltaThink) has ever seen. 2) ToxHub – this new online community was recently launched and to date more than 500 messages have been posted. ED Olson expressed her gratitude to President Heartsill, one of the first SOFT members she met when he hosted the Dallas meeting. She also thanked the Board for all of their hard work, time, and support. ED Olson thanked the Planning Committee, especially with staff changes at the office. She continued to thank the meeting hosts, as well as her family and the time they volunteered this week. She concluded her report by thanking the membership and SOFT as a whole.

6. Secretary's Report Madeleine Swortwood

    a. Secretary Swortwood asked for a moment of silence for those we have lost in the last year. She then discussed the growth in membership numbers by category, with a total of 1605 members. She discussed the new streamlined process for membership application and promotion which has gone well.

7. Treasurer's Report Robert Johnson

    a. Treasurer Johnson reported that the budget was submitted to the membership in ToxTalk Issue 2 earlier this year. He reported that while registration at the annual meeting was lower than recent years, the reduced revenue was offset by reduced F&B costs. He reported that we are in a strong financial position with the meeting and as an organization. The updated account balances were presented but did not yet reflect the cost of the annual meeting. Treasurer Johnson reported that our investment account with Charles Schwab is doing well. The financials will continue to be published in upcoming issues of ToxTalk.

8. President Elect's Report Jeri Ropero-Miller

    a. President Elect Ropero-Miller reported that the committees were very busy this year as our diversification initiative continued. Currently, we have more than 200 members serving on more than 20 committees. On November 12, applications will open for those interested in serving on a committee, with a close date of December 3. The annual Committee Activity Update meeting will continue to be held virtually and will take place on December 10. This will be recorded and available to watch later for those unable to attend live.

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

9. Regional Toxicology Liaison Report Amy Miles

a. Amy reported to the membership that all RTL activities are posted to the SOFT website under the "Resources" tab, including all reports that go to NHTSA. This past year, they expanded the regions for each existing RTL (Sabra Jones, Chris Heartsill, and Kristen Burke) and added Amy Miles as a fourth RTL. As a group they tackled training in their regions related to 1) implementing ASB standards, 2) testimony training, and 3) data (LIMS and reporting). Amy also reported that they have a new position vacancy that they are working towards filling as they review applications.

10. JAT Special Issue Dayong Lee/Becky Wagner

a. JAT Co-Editor-in-Chief Lee presented Becky Wagner with an award to thank her for her service as JAT Special Issue Editor.

b. SOFT Special Issue Editor Becky Wagner reported that the Special Issue will be published after this meeting. She reported that there were 15 submissions, and 12 will be featured in the Special Issue, including 11 articles and 1 case report. She thanked the authors for their submissions and the reviewers for their effort. Of the 12 manuscripts, she reported that 9 were considered eligible for the EDIT Award, which recognizes scientific design and impact. Along with the Publications Committee, they reviewed and discussed the eligible articles. Special Issue Editor Becky Wagner presented the EDIT Award to Amanda Pacana on her paper titled "A novel screening workflow for nitazene analogs using LC-MS/MS precursor ion scan acquisition".

11. Drugs & Driving Travel Award (CSLA) Sara Dempsey

a. Chair Dempsey announced that the CSLA award ($500) is for best platform in the Drugs & Driving Special Session. The award was presented to Kari Midthun for her presentation entitled "N-2-O(h) No! The Rise of Nitrous Oxide in DUID Casework and Best Practice Recommendations".

12. SOFT Awards Sara Schreiber

a. ERA/YSMA 2025: The award criteria and presentation titles were displayed on screen. The win ners were presented with their awards. Awardees presented during a special session on Thursday of this 2025 SOFT meeting.

- ERA (Masters) – Seokjin Hwang, "Fast & Forensic: Rapid Detection & Quantitation of 30 + Emerging Novel Psychoactive Substances in Hair"

- ERA (Doctorate) – Maria Sarkisian, "Characterization and Optimization of Identification Criteria for Routine LC-QTOF-MS Targeted Analysis"

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

- ERA (Doctorate) – Marco Ballotari, "Analysis of Cannabinoids and Semi-synthetic Cannabinoids in Authentic Breastmilk by Liquid Chromatography-Tandem Mass Spectrometry"
- YSMA – Nicholas Khorozov, "Synthetic Cannabinoid Quantification on Infused Paper from Prisons by Liquid Chromatography Tandem Mass Spectrometry"

b. Annual Awards 2025: The award criteria and information about the recipients were displayed on screen.

- Young Forensic Toxicologist Service Award – Joe Kahl (nominated by Diane Moore)
- Teaching & Mentoring Award – Robert Kronstrand (nominated by Svante Vikingsson)
- Research in Forensic Toxicology Award – Svante Vikingsson (nominated by Robert Kronstrand)
- Distinguished Service Award – Marilyn Huestis (nominated by Dayong Lee)

c. Huestis & Smith Travel Award Marilyn Huestis

- TIAFT members selected to attend and present at this meeting in Portland:
- Karolina Nowak (Poland) – "Determination of Synthetic Cannabinoids in MGG-Stained and Unstained Blood Smears: Innovations in Modern Toxicology"
- Asli Atasoy Aydin (Turkey) – "Non-Invasive Detection of Psychoactive Substances in Breath Samples: Development of a Breath Collection Device"
- Jari Rubbens (Belgium) – "Translating UPLC-QTOF Screening from Research to Routine: Validation, Accreditation, and Implementation for Systematic Toxicological Analysis"
- SOFT members selected to attend upcoming TIAFT in New Zealand:
- Gillian Sayer – "Development and validation of a general-purpose broad-spectrum LC-QTOF screening method in blood, serum/plasma, and urine using minimal sample volume"
- Kei Osawa – "Mitragynine: Distribution in Postmortem Specimens Plus Three Interesting Cases"
- Madison Shackmuth – "Cytochrome P450-Mediated Metabolism of Isotonitazene, a Novel Synthetic 2-Benzylbenzimidazole Opioid"

13. Recognition of Workshop Chairs Mary Lynn Heffington & Dani Mata

a. Mary Lynn and Dani displayed the names of workshop chairs and workshop titles for the 16 workshops presented this week. Workshop chairs were thanked and presented with their certificates.

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

14. Recognition of Webinar Chairs Kari Midthun & Kei Osawa

    a. Kari and Kei displayed the names of the webinar hosts and webinar titles for the 6 webinars this year. The webinar hosts were presented with their certificates. Kari and Kei also thanked those who participated in the Legacy Luncheon series.

15. SOFT/TIAFT 2026 Chicago Andre Sukta & Luke Rodda

    a. Andre and Luke played a short video about Chicago and then provided some meeting information to the membership. The meeting hotel and conference venue is the Hilton Downtown Chicago. They provided a tentative schedule, noting to the membership that the schedule is shifted by one day to more closely resemble the TIAFT schedule. Of note, workshops will be held on Sunday and Monday. There will be parallel scientific sessions. The Tuesday off-site session will be at the Field Museum. Thursday night will be the closing ceremony. The Planning Committee was announced and presented on the screen.

16. Announcements Chris Heartsill

    a. AAFS will be February 9-14, 2026 in New Orleans.

    b. ASB

    c. Elections: The slate of officers as proposed by the Nominating Committee was published in the most recent issue of ToxTalk and is as follows: encourages you to provide public comments for standards.

    d. ABFT Incoming President Dan Anderson encouraged everyone who is eligible to apply for certification.

    e. MATT (Midwest Association for Toxicology and Therapeutic Drug Monitoring) invites you to their meeting in Cincinnati, OH on March 18-20, 2026.

17. Unfinished Business Chris Heartsill

    a. There was no unfinished business to discuss.

18. New Business Chris Heartsill

    a. Outgoing Officers and Directors were recognized and thanked for their contributions. They were:

        - Director Bill Johnson
        - Counselor Laurel Farrell
        - Immediate Past President Tate Yeatman

Society of Forensic Toxicologists

Business Meeting Agenda and Minutes Annual Meeting 2025

Portland, Oregon Thursday, October 30, 2025 at 3:30 pm Pacific

b. Slate of new directors and officers.

- Madeleine Swortwood – President Elect
- Dayong Lee – Secretary
- Erin Karschner – Director
- Alex Krotulski – Director

President Heartsill asked for any nominations from the floor. There were no nominations from the floor, therefore the proposed slate of officers was approved by acclamation.

19. Recognition of Past Presidents Chris Heartsill

a. President Heartsill asked the Past Presidents present to stand with their medallions for recognition.

b. Incoming President Jeri Ropero-Miller was presented with her medallion by Outgoing President Heartsill.

c. Incoming President Jeri Ropero-Miller presented Outgoing President Heartsill with an award to commemorate his efforts.

20. Incoming President's Remarks Jeri Ropero-Miller

a. Jeri expressed her gratitude and enthusiasm for her new role. She appointed Teresa Gray as the JAT Special Issue Editor and her appointment for Counselor will be announced in an upcoming issue of ToxTalk. Her goals for the next year are: 1) Membership Survey final report, 2) Five-Year Strategic Plan, 3) Committee collaboration, 4) Training and education, 5) Scientific integrity and collaboration, 6) Inclusion, transparency, and sustainability. She thanked everyone for their dedication to the field and the organization.

21. Adjournment Chris Heartsill

a. President Heartsill drew the winners of Free Registration for 2025. The winners were Lydia Hubbard and Erin Karschner.

b. Motion to adjourn (Sara Schreiber); Second (Rusty Lewis); Approved by all.

- The meeting was adjourned at 5:14 pm Pacific.

Upcoming Important Deadlines for 2026

The first issue of ToxTalk 2026 will have the important deadlines regarding the call for workshops, workshop proposals, etc. Be on the lookout and understand that there will be an accelerated timeline this year due to the joint meeting with TIAFT.

See below for a message from the 2026 SOFT JAT Special Issue Editor Teresa Gray!

Happy holidays! As you finalize your holiday to do list, add preparing a manuscript for the 2026 JAT SOFT Special Issue! The submission deadlines are earlier than usual, so plan accordingly. Please email me your title and abstract by Friday, February 6, 2026. Your completed manuscripts are due in Manuscript Central by Friday, February 20, 2026. I am excited to work with you to create a Special Issue that reflects the amazing work done by the forensic toxicology community.

Please reach out if you have any questions and see you in Chicago!

2026 Special Issue Editor
Teresa Gray, PhD, F-ABFT
teresa.gray@ifs.hctx.net

ANNUAL MEETING UPDATE - CHICAGO, IL

The 2026 Joint SOFT – TIAFT Annual Meeting in Chicago, Illinois will be held the week of September 19-24 at the Hilton Downtown Chicago!

Get ready for an unforgettable experience as the SOFT-TIAFT joint meeting comes to Chicago in 2026! Known as the "Windy City," Chicago offers a vibrant mix of culture, history, and innovation, making it the perfect backdrop for this global gathering of forensic toxicologists.

Chicago is not as windy as our name suggests, we are not even in the top ten windiest cities, but our name comes from our politicians who are full of hot air, specifically when competing to host the 1893 World's Fair. However, any local will tell you when that wind is coming in off the lake you better be dressed appropriately. We will be steps away from Grant Park, often called Chicago's front yard, a huge area of grass, gardens, walking paths, sport fields, Millennium Park, and the Museum Campus. Buckingham Fountain, one of the largest fountains in the world, was dedicated in 1927 and can shoot water up to 150 feet in the air. Millennium Park houses Cloudgate, aka "The Bean", a social media favorite.

The museum campus hosts world-class museums;

- The Field Museum (our offsite event location) allows you to explore natural history, meet Sue, the largest and most complete T. Rex ever discovered, and meet Maximo, the largest dinosaur uncovered to date.
- The Art Institute of Chicago is home to masterpieces from Monet to modern art. You can step inside and imagine being part of Ferris Bueller's Day Off.
- The Shedd Aquarium opened in 1930 is host to 32,000 animals. Come see sharks, penguins, and sea otters. The aquarium also offers animal encounters, penguin, shark feeding, sea otter, beluga, and sea lion, for an additional fee.

- The Adler Planetarium was the first in the western hemisphere and is a major institution for astronomical education and research. The sky shows are a must see.
- Also in the museum campus is Soldier Field, home to the Chicago Bears (American Football) and the Chicago Fire (Soccer).

2026 HOSTS

Andre Sukta

Luke Rodda

SCIENTIFIC PROGRAM COORDINATORS
SUMAN RANA
DONNA COY
JENNIFER SCHUMAN
BRIGITTE DESHARNAIS

WORKSHOP COORDINATOR
CRAIG CHATTERTON
SUE PEARING
KAREN SCOTT

VOLUNTEER COORDINATOR
SARAH DOUGLAS
SVANTE VIKINGSSON

SOCIAL COORDINATOR
BRIAN JONES

FUN RUN COORDINATOR
DOMINIQUE GIDRON

JAT SPECIAL ISSUE EDITOR
TERESA GRAY (SOFT)
JENNIFER SCHUMANN (TIAFT)

MOBILE APP
ROXANE RITTER
SUNDAY HICKERSON
TYLER DEVINCENZI

AV COORDINATOR
FRANK WALLACE

FOOD & BEVERAGE
ANN MARIE GORDON
DENICE TEEM
DELISA DALGLEISH

YOUNG FORENSIC TOXICOLOGISTS
WHITNEY BROWN

YOUNG FORENSIC SCIENTIST
BRONWEN DAVIES

REGISTRATION COORDINATOR
RICHARD COVEN

SEPTEMBER 19-24, 2026

2026 PLANNING COMMITTEE MEMBERS

From deep-dish pizza and Chicago-style hot dogs to Michelin-starred dining, the city's food culture is second to none. Don't miss the chance to explore diverse neighborhoods offering global flavors.

On to the real reason we get together, the annual meeting will be truly a fusion of both SOFT and TIAFT meetings, ensuring the best experience for all.

- Saturday evening: YFT/YSC Symposium
- Sunday and Monday: Two full days of 24 half-day workshops.
- Sunday afternoon: Committee meetings
- Monday evening: Opening Ceremony, Welcome Reception, Elmer Gordon Forum and Nite Owl
- Tuesday to Thursday: Two and a half days of dual-track scientific sessions and poster sessions.
- Tuesday evening: Offsite event at The Field Museum
- Wednesday evening: YFT/YSC Night Out, Optional add-on excursions, or do your own thing.
- Thursday Afternoon: Wrap up with business meetings and the President's Reception.
- Friday: No post-reception scientific sessions

** Submissions for workshop and scientific abstracts will be coming up in March and April!

Travel Tips for SOFT-TIAFT 2026 Attendees

If you can arrive early or stay post meeting, take advantage of City Pass to get discounted ticket pricing by bundling multiple attractions together.

Airports & Arrival

- **O'Hare (ORD)** — ~17 miles from downtown, ~1,000 daily flights; CTA Blue Line gets you downtown in ~40 minutes for around $5 .
- **Midway (MDW)** — ~10 miles out, accessible via CTA Orange Line in ~25 minutes .
- **Union Station** — Amtrak hub with easy CTA access (Clinton or Quincy stations); ride-share and taxis available outside

Getting Around

- **Ventra Card or app** – buy 1/3/7-day CTA passes ahead of time and tap on buses or the 'L'.
- **Public transit convenience** – Blue (O'Hare), Orange (Midway), Brown/Red for downtown excursions. Water Taxi, and Divvy bike-sharing.
- **Ride-share & exec car services** – Uber/Lyft zones at airports.

Dining Around Grant Park & Millennium Park

In & Around Millennium Park

- Millennium Hall (11 N Michigan Ave) – beneath Cloud Gate; seasonal local-ingredient menus & large beer garden.
- Cindy's Rooftop (13th-floor Chicago Athletic Assoc.) – panoramic views of lake & park, fresh seafood, creative cocktails.
- The Gage – upscale gastropub just steps from the park, known for hammered-throughs like salmon sandwiches.
- Acanto – authentic Italian wine bar with Squid-Ink pasta and excellent wine.
- Remington's – steakhouse across Michigan Ave with crab cakes & cocktails.

Casual & Iconic Lunch Spots

- Wildberry Pancakes & Café – hearty breakfasts near Art Institute.
- Miss Ricky's – French-Italian fare, top-rated traveler favorite.
- Taco Maya – South Loop favorite for tacos & street-corn vibe.
- Lou Malnati's – Classic Chicago-style deep-dish near the park.

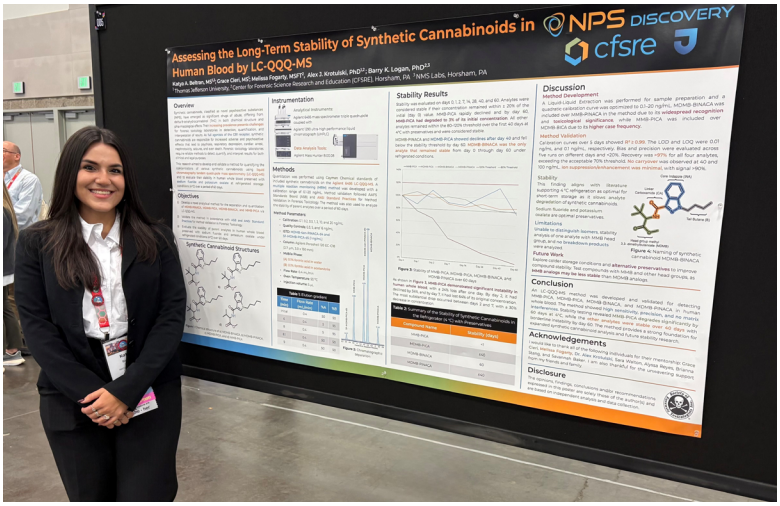
Upscale & Trendy Dining

- The Walnut Room (Macy's) – historic, iconic pot-pie & wine in the theater district.
- Mercat a la Planxa – Spanish tapas in South Loop, perfect for shared small-plates.

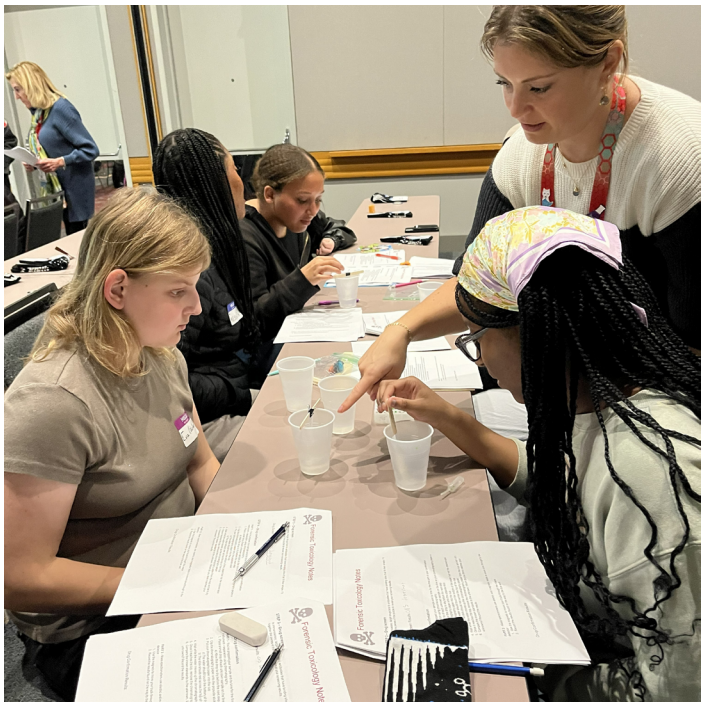
Chicago's compact core means many experiences—cultural, culinary, iconic—are walkable or just a short train or bike ride away from the host hotel. Be sure to mark your calendars, pack your bags, bring some comfy shoes as we welcome you to Chicago. This is your opportunity to collaborate, connect, and be inspired by the beautiful city and leading minds in forensic toxicology. On behalf of the SOFT-TIAFT Planning Committee and hosts, we look forward to seeing you there!

Andre and Luke

We hope everyone had a great time attending the annual meeting in Portland, Oregon and we would like to especially thank everyone that attended and participated in the various YFT committee activities!
The week began with the Professional Development Fair (PDF) and YFT Symposium that took place on Sunday, October 26th. We had 9 organizations participate in the PDF and 102 attendees for the PDF and Symposium! Symposium attendees first heard presentations from the 2024 Leo Dal Cortivo award winners, Amanda Pacana (platform winner), and Brianna Stang (poster winner). The SOFT Board of Directors attended and participated in the icebreaker, which divided attendees into smaller groups where they could discuss changes they've experienced in technology, instrumentation, and processes in their labs. The symposium concluded with a panel discussion about the future of toxicology in terms of AI, automation, green toxicology, and NPS drugs. A special thanks to Kari Midthun, Sabra Jones, Luke Rodda, Maria Sarkisian, and Tyler Devincenzi for presenting!



YFT activities continued Monday, October 27th with the Student Enrichment Program (SEP). The SEP had 35 attendees from a local high school that learned about forensic toxicology through presentations and hands-on activities. Thank you to Ashley Westerlund from the Oregon State Police – Portland Metro Lab as well as SOFT volunteers Alaina Holt, Steve Raso, and Siobhan McKenny for assisting. Monday also included a half-day workshop titled Method Development: Foundations for the New Toxicologist, Part I that was presented in conjunction with the SOFT Applied Analytical Toxicology Committee. The workshop was well-attended and discussed principles for sample prep, chromatography, and mass spectrometry as well as implementation of automated processes.



The YFT committee concluded the annual meeting with the presentation of the Leo Dal Cortivo award winners on Thursday, October 30th at the President's Banquet. Platform presentation winner Alaina Holt ("Lipid Lifeboats: Capturing Fentanyl with Bioengineered Liposomes") and poster presentation winner Katya Beltran ("Assessing the Long-Term Stability of Synthetic Cannabinoids in Human Blood by LC-QQQ-MS") each receive a $1,000 cash prize and free registration to a future SOFT meeting. Congratulations Alaina and Katya!

Finally, the YFT committee would like to recognize the committee members that are rotating off at the end of this year: Amanda Brooking, Erin Strickland, Lindsey Vosters, Lauren Wolfe, and Edward Zumaeta. Thank you so much for your time and hard work on the YFT committee!

REGIONAL TOXICOLOGY LIAISONS

PROJECT MANAGER: AMY MILES, amy@soft-tox.org
REGION 5: SABRA JONES, sabra@soft-tox.org
REGION 7: CHRIS HEARTSILL, chris@soft-tox.org
REGION 9: KRISTEN BURKE, kristen@soft-tox.org

2025 marked a year of significant growth and expansion for the Regional Toxicology Laboratory (RTL) program. The program extended beyond traditional NHTSA regions and adapted to varying state lab structures. Leadership included Sabra Jones overseeing the Northeast (18 states), Chris Heartsill expanding Mid-South to include Oklahoma, Texas, and Colorado, Kristen Burke managing the Western region with New Mexico added, and Amy covering the Midwest, now including the Dakotas.

From its inception, the program focused on three core areas: standardization, training, and data alignment.

Standardization: Labs were surveyed to identify barriers to implementing standards. Plans are underway to address these through targeted training in 2026. Method development and validation support were initiated with external partners, though a larger grant proposal is currently on hold. Sabra and Chris actively contribute to standards development, ensuring alignment with laboratory needs.

Training: Recognizing that training budgets are often cut, RTLs provided free webinars and solicited topic suggestions from labs. Over the past year, training offerings increased significantly, reaching diverse audiences, including law enforcement, attorneys, judges, toxicologists, treatment courts, and State Highway Safety Offices (SHSO). Topics ranged from testimony skills and forensic toxicology basics to funding strategies and partnership building. New collaborations with AllRise - Impaired Driving Solutions, and Judicial Outreach Liaisons (JOL) promise further growth. During the SOFT conference in Portland, the RTLs were very active. Sabra and Kristen organized and chaired two half-day workshops, and Chris and Amy presented in a separate one. Looking ahead to 2026, the RTLs are planning a leadership training series for professionals at all career stages, in partnership with Responsibility.org . Between October 2024 and September 2025, training reached participants from 31 states, with thousands attending conferences nationwide.

Data Alignment: The RTLs partnered with the Association of Transportation Safety Information Professionals (ATSIP) to ensure the integration of toxicology data into state DUI systems. A working group is exploring pilot labs for grant-funded initiatives.

Other collaborations included RTLs contributing to the rewriting of a monograph for the National Traffic Law Center. Continued work with Traffic Safety Resource Prosecutors and exploring research topics, which included connecting Dr. Heather Barkholtz with AllRise to study cannabis detection, and exploring innovations like POC cups.

Last, but probably the most important update, the RTLs are working with NHTSA to fill an RTL vacancy, attracting 16 applicants. By the time ToxTalk is published, the RTL program will have another member!

Please direct any questions about the RTL program to any of the RTLs.

Amy Miles

VISIT THE RTL WEBPAGE!

PROFESSIONAL MENTORING PROGRAM

The Professional Mentoring Program (PMP) committee enjoyed getting to visit with mentee and mentors at the 2025 SOFT meeting in Portland. While the program takes advantage of many video platforms that help us connect no matter where we work in the country, or even the world, it is always good to see each other in person. This year we hosted a breakfast that fueled interesting conversations about topics ranging from what unrelated jobs people have had that helped in their career today to the yearly goal progress of various pairs. One pair talked about a goal centered around presentation skills which culminated in that mentee presenting a poster at SOFT this year.

We also presented our PMP poster which showed the changing trends and gave us a chance to discuss the changes we have made with program participants in person. While there is a strong value placed on webinars, the survey showed that participation did not match interest, so a change was made to how the webinars were offered this year. One common feedback during the poster session was participants enjoyed having multiple webinar options on-demand so that they could watch whichever topic matched their goals when it was more convenient for them. Another pair mentioned that the topics do not always relate to their goals so they appreciated there being more options this year. Many appreciate the networking aspect of the program. While the designation of mentor and mentee is given, visitors to the breakfast and poster talked about how the relationships were mutually beneficial in that they learned from each other.

As we wrap up this year, we would like to request that PMP participants gather any pictures taken during the year to be shared when it is time to prepare for commencement. With a great 2025, we cannot wait to see what the program will bring in 2026. Please enjoy a collage of the PMP participants at this year's SOFT.

Toxicology Resource Committee: 2025 Year in Review

The Society of Forensic Toxicologists' Toxicology Resource Committee (TRC) had a productive and collaborative 2025, marked by renewed initiatives, expanded partnerships, and meaningful contributions to SOFT's mission. The Committee is composed of **Sabra Jones (Chair 2024-2025), Joey Jones (Co-Chair 2024-2025), Kristen Burke, Dominique Gidron, Chris Heartsill, Scott Larson, Matt Meyers, Karen Scott, Sara Short, and Lucas Zarwell.**

Advancing Key TRC Initiatives

Salary Survey

A major area of progress this year was the advancement of the TRC Salary Survey. Initial development continued with support from the **University of Wisconsin Survey Center (UWSC)** and included discussions regarding survey content, design, and expectations for data reporting. The survey was disseminated to all SOFT members, and data is currently being analyzed and will be shared with the SOFT Board and membership.

ToxTalk Feature: "Three Things You Should Know About Obtaining Toxicology Resources"

The TRC also contributed to SOFT's educational mission through the publication of **"Three Things You Should Know About Obtaining Toxicology Resources,"** led by **Scott Larson in collaboration with all TRC members**. The article provides a practical overview of how laboratories can increase their access to critical resources through grant funding, cross-agency collaboration, strategic proposal development, and leveraging of analytical tools such as Project FORESIGHT. It highlights avenues for instrumentation funding, training opportunities, accreditation planning, data-sharing improvements, and the importance of cultivating relationships with public health, law enforcement, medical examiners, universities, and state government leaders.

Joint Continuing Education Webinar with the Applied Analytical Toxicology Committee

A major 2025 milestone was the TRC's collaboration with the Applied Analytical Toxicology (AAT) Committee to deliver the joint Continuing Education webinar: "**Going Paperless: Shredding the Barriers to a More Efficient and Greener Laboratory Operation**." Co-chaired by **Dr. Rebecca Wagner (Chair of the AAT) and Dr. Sabra Jones**, the webinar addressed the modernization of forensic laboratories through paperless workflows and LIMS-driven digital transformation. Expert speakers—including **Dr. Stephen Raso, Gregory Janis, and Scott Larson**—covered challenges such as change management, data security, and workflow integration, as well as efficiency gains achieved through automation and digital solutions. A concluding panel discussion expanded the dialogue with contributions from **Wayne Lewallen, Erin Feazel, and Etienne Lebrun**, who provided additional perspectives on implementation challenges and practical lessons learned. The SOFT TRC and AAT teamed up with **SOFTopics** for a follow-up small group discussion on the topics covered in the webinar.

Toxicology Resource Committee: 2025 Year in Review

Strengthening Partnerships and Resource Sharing

Throughout 2025, committee members emphasized collaboration as a central element of the TRC's mission. Discussions highlighted strategies to support laboratories across the country by improving communication with state agencies, sharing grant-funded project successes, and promoting a stronger network of resource-oriented partnerships. Members also shared insights on automation, funding models, and the importance of cultivating relationships with agencies whose missions intersect with toxicology—from public health to law enforcement to prosecutors' offices.

Looking Ahead

The TRC will continue advancing its mission into 2026 with several priorities, including **sharing the results of the Salary Survey**, expanding opportunities for resource education, and supporting SOFT members through continued collaborations and content development. The Committee is also considering a proposed project focused on **developing strategies to better identify and address gaps in education that impact forensic toxicology laboratories**.

Under the leadership of **Joey Jones (Chair 2026-2027) and Scott Larson (Co-Chair 2026-2027)**, the TRC remains committed to improving access to resources, supporting laboratories of all sizes, and ensuring SOFT members have the tools needed to thrive in a rapidly evolving forensic toxicology landscape.

Sabra Jones

Postmortem Committee Updates

Summary of Postmortem Scientific Session Presentations at SOFT 2025

The SOFT Postmortem Committee serves as a resource for medicolegal professionals and to promote collaboration, interdisciplinary research, and communication between forensic toxicologists, forensic pathologists and medical examiners/coroners, medicolegal death investigators, and law enforcement to assist in the determination of cause and manner of death. This is mainly achieved through workshops, trainings, and continuing education events.

Over the last year, the committee welcomed five new members and continued to add to its library of literature references on the SOFT website, which covers topics on interpretation of postmortem toxicological results, postmortem redistribution, and analytical methodologies that support published ANSI/ASB Standards that are related to postmortem toxicology. Recommendations were sent to NAME for improvements to their inspection and accreditation checklist for Medical Examiners; these recommendations were adopted by NAME and implemented in their July 2025 amended checklist. A survey on ANSI/ASB Standard 119 laboratory conformance is nearly complete and will hopefully be sent to the SOFT membership in the coming months. During the two open meetings held this year, many interesting topics were discussed including resources for overcoming barriers to a faster turnaround time, postmortem oral fluid testing and its current challenges and lack of published data, national NPS drug trends and the ability to identify/quantify them, and potential alternatives for carbon monoxide testing.

This year at SOFT, members of the committee organized a workshop on the unique challenges of interpreting pediatric toxicology and the complexities of analytical testing with smaller sample sizes and varied specimen types, as well organized and presented at a workshop on the success of postmortem investigations through close working relationships between medical examiners/pathologists, death investigators, and forensic toxicologists. Both workshops were well-attended, and the speakers received excellent feedback from the attendees. There were also two scientific sessions related to postmortem toxicology that the committee wanted to share a summary of the excellent presentations that took place. For full abstracts of these presentations, the SOFT 2025 program book may be accessed here.

(S-14) The identification of N-isopropyl butylone in postmortem cases in Northern Virginia.

Ashley Pluer[1], Travon Cooman1, Meghan Kessler[2]

[1]Virginia Department of Forensic Science, Manassas, VA, USA; [2]Office of the Chief Medical Examiner of Virginia, Manassas, VA, USA

N-isopropyl butylone was first identified by the Controlled Substances Section of the Virginia Department of Forensic Science (VA-DFS) in March 2024 and has been identified in 136 controlled substances cases across the state. Between July and September 2024, the Toxicology Section of the Northern Laboratory of VA-DFS identified N-isopropyl butylone in six postmortem cases. All cases exhibited poly-drug use with fentanyl identified in every case.

Postmortem Committee Updates

(S-17) Postmortem benzodiazepines 6-year review in Franklin County, Ohio with most recent contender phenazolam.

Jennifer Hobbs[1], Han-Tian Guo2, Camille Colletti[1], Rebecca DeRienz[1]

[1]FCFSC Office of the Coroner Division of Toxicology, Columbus, OH, USA; [2]FCFSC Office of the Coroner, Columbus, OH, USA

Postmortem casework between 2019 and 2024 from Franklin County, OH was reviewed for the prevalence of benzodiazepines. There were 545 overdose cases which included a benzodiazepine on the toxicology report, with alprazolam (n=137), diazepam (n=92), and bromazolam (n=74) being the most prevalent. Franklin County reported its first phenazolam positive case in February 2025. The case was also positive for its metabolite α-hydroxyphenazolam, as well as acetone, β-hydroxybutyric acid, ketamine, norketamine, cannabinoids, and fentanyl.

(**S-18) High behind bars: a retrospective study of drugs detected in Miami-Dade correctional facilities.**

Marissa Finkelstein, Diane Moore

Miami-Dade Medical Examiner Department, Miami, FL, USA

To evaluate toxicological findings in inmate deaths and the prevalence of NPS in correctional facilities, a retrospective review was performed on all inmate deaths that occurred in Miami-Dade County, FL from January 2015 through May 2025. During that time period, there were 756 inmate deaths; 75% were certified based on medical histories with no additional testing and the remaining 25% received toxicology testing. Of those cases, 40 were the result of a drug overdose with synthetic cannabinoids, synthetic cathinones, fentanyl, and cocaine, in combination with other drugs, being the most prevalent substances.

(S-19) A PCP overdose death in Northern Virginia: a case study.

Courtney Wardwell[1], Carmen Coles[2]

[1]Virginia Department of Forensic Science, Manassas, VA, USA; [2]Office of the Chief Medical Examiner – Northern District of Virginia, Manassas, VA, USA

Between 2020 through 2024, the Virginia Department of Forensic Sciences quantitated PCP in 96 medical examiner cases, with an average concentration of 131 ng/mL. The case presented had a high concentration of PCP which prompted the laboratory to evaluate a larger dilution (1/40) to properly quantitate this case. The average concentration of PCP in this case, following triplicate analysis on a 1/40 dilution, was 5600 ng/mL. The case was ruled a PCP overdose as a result of the toxicological and autopsy findings.

Postmortem Committee Updates

(S-55) Case series involving N-isopropyl butylone: a novel synthetic cathinone implicated in fatalities.

Sara Walton[1], Michael Truver[2], Donna Papsun[3], Chris Chronister[2], Alex Krotulski[1], Barry Logan[1,3]

[1]Center for Forensic Science Research and Education, Horsham, PA, USA; [2]Forensic Toxicology Laboratory, Department of Pathology, Immunology, and Laboratory Medicine, University of Florida College of Medicine, Gainesville, FL, USA; [3]NMS Labs, Horsham, PA, USA

N-Isopropyl butylone is the most recent synthetic cathinone to emerge and proliferate on the illicit drug market. It was confirmed in 15 postmortem cases and one antemortem case collected between August and November 2024, with a median blood concentration of 51 ng/mL (mean, 210±370 ng/mL; range, 1-1400 ng/mL). It was identified alongside other synthetic cathinones, fentanyl, cocaine, methamphetamine, ethanol, and other NPS. Causes of death were primarily attributed to multi-drug toxicity and blunt-force trauma.

(S-56) Extended release, extended risk: a fatal case of bupropion and trazodone toxicity.

M. Elizabeth Zaney, Nicholas Barna, Jennifer Gonyea, Marissa Finkelstein, Diane Moore

Miami-Dade Medical Examiner Department, Miami, FL, USA

A 25-year-old female ingested an excess of 50 mg immediate-release trazodone and 300 mg extended-release bupropion tablets. She was transported to the hospital but was not treated with activated charcoal or gastric lavage; she died two days later after suffering a cardiac arrest. Bupropion/hydroxybupropion and results between the admission blood and postmortem iliac vein blood indicated that ongoing absorption of the extended-release bupropion occurred during the hospital stay (0.15/0.25 mg/L compared to 40/31 mg/L), whereas the trazodone/mCPP results between the two blood specimens declined as expected (7.4/1.2 mg/L compared to 0.85/0.93 mg/L).

(S-57) Quantitative analysis and postmortem redistribution evaluation of select NPS benzodiazepines in postmortem casework.

Elisa Shoff, Joseph Kahl, Diane Moore

Miami-Dade Medical Examiner Department, Miami, FL, USA

An LC-MS/MS method to quantify four NPS benzodiazepines (etizolam, bromazolam, flualprazolam, and flubromazolam) was developed to analyze a total of 174 postmortem specimens from 81 cases to evaluate potential postmortem redistribution. Central to peripheral blood (C/P) and liver to peripheral blood (L/P) concentration ratios were calculated for each analyte. The findings of the study are consistent with published data suggesting that the average C/P and L/P concentration ratios indicate minimal postmortem redistribution.

Postmortem Committee Updates

(S-58) GHB: what does the concentration mean? Review of antemortem and postmortem casework from 2020-2025.

Laureen Marinetti, Kevin Shanks, Stuart Kurtz

Axis Forensic Toxicology, Indianapolis, IN, USA

Interpretation of GHB in postmortem blood and urine can be problematic. A review of 401 cases (postmortem and antemortem combined) that were tested for GHB was performed to determine cutoff ranges in blood and urine. Based on the results, proposed cutoff ranges are between 20-50 mg/L for postmortem blood and between 10-30 mg/L for postmortem urine. A detailed history and the ability to test of additional specimens, such as urine and vitreous fluid, may be necessary to differentiate between endogenous production and exogenous ingestion.

(S-59) When routine toxicology is negative: the critical role of seized drug analysis in a medicolegal death investigation involving vaping.

Jeffrey Walterscheid[1], Kimberly Westberry[2], Brianna Stang[3], Alex Krotulski[3], Sara Walton[3], Christopher Gordon[4], Erin Karschner[1]

[1]Division of Forensic Toxicology, Armed Forces Medical Examiner System, Dover AFB, DE, USA; [2]United States Army Criminal Investigation Laboratory, Forest Park, GA, USA; [3]Center for Forensic Science Research and Education, Horsham, PA, USA; [4]Forensic Pathology Investigations, Armed Forces Medical Examiner System, Dover AFB, DE, USA

A 22-year-old male was found deceased in bed with a foam cone, and autopsy revealed extensive pulmonary congestion and edema with microscopic evidence of acute bronchitis. Multiple vaping devices found on scene were tested and yielded the presence of CHO-4'Me-5'Br-FUBOXPYRA and protonitazene; these analytes were ultimately confirmed in the decedent's blood and urine through expanded toxicology testing and attributed as the cause of death. This investigation illustrates the need for laboratories to maintain a contemporary scope of NPS with low limits of detection, as well as the importance of collaboration between toxicology and seized drug laboratories in medicolegal death investigations.

Postmortem Committee Updates

(S-60) The cost of clarity: death after participation in a heart protocol ceremony involving MDMA and ketamine.

Diane Moore, M. Elizabeth Zaney, Tiffany Sheganoski

Miami-Dade Medical Examiner Department, Miami, FL, USA

A 51-year-old female was found deceased in a rooftop sauna after participating in a wellness retreat. During the investigation, it was determined that part of the wellness retreat included a gastrointestinal cleanse followed two days later by a guided psychedelic “heart protocol”, during which MDMA and ketamine were administered by a licensed psychiatrist. Based on the autopsy findings, toxicology results (MDMA, MDA, ketamine, and Norketamine in iliac vein blood at concentrations not associated with fatal concentrations), and medicolegal death investigation, the cause of death was determined to be “hyponatremic dehydration due to confinement in sauna and use of MDMA and ketamine”.

Oral Fluid Committee: Presentation Updates

The SOFT/AAFS Oral Fluid Committee would like to highlight presentations given during the International Association of Chiefs of Police (IACP) 2025 Impaired Driving and Traffic Safety (IDTS) Conference in Chicago, Illinois as well as the Society of Forensic Toxicologists (SOFT) annual meeting in Portland, Oregon in which oral fluid is used as a matrix of interest. Summaries from each presentation are included below.

Presentations from the 2025 IDTS Conference:

- **Impaired Driving: Insights from Blood and Oral Fluid Testing and Examination of Large Arrest Data Sets**
  - Barry K. Logan - NMS Labs
  - Amanda L. Mohr - The Center for Forensic Science Research

In 2025, the Center for Forensic Science Research & Education (CFSRE) supported the Drug Recognition Expert (DRE) program by conducting certification testing using oral fluid as the biological matrix. A total of 759 oral fluid samples were collected and analyzed as part of DRE evaluations nationwide. The most frequently called drug category by DREs was the combination of a stimulant and a narcotic analgesic, followed by a stimulant only call. The table compares the alignment between Drug Recognition Expert (DRE) opinions and toxicology results across six drug classes. The highest alignment rates were observed for stimulants (93%), narcotic analgesics (86%), and CNS depressants (80%). Alignment was lower for cannabis (49%) and dissociative anesthetics (35%), with hallucinogens showing no alignment (0%) in the small number of cases (n=3). Misalignment rates were highest for hallucinogens (100%), dissociative anesthetics (65%), and cannabis (51%).

Class	Opinion Aligns with Tox	Opinion Doesn't Align with Tox
CNS Depressants (n=69)	80%	20%
Stimulants (n=376)	93%	7%
Hallucinogens (n=3)	0%	100%
Dissociative Anesthetics (n=23)	35%	65%
Narcotic Analgesics (n=616)	86%	14%
Cannabis (n=106)	49%	51%

Oral Fluid Committee: Presentation Updates

- **Cops, Cannabis, and Chemical Testing**
  - Ryan L. Hutton - Extract-ED
  - Matthew Levitas - Forensic Fluids

How is cannabis absorbed into the body over time and when are consumers impaired? Extract-ED conducts cannabis detection workshops ('green labs') for law enforcement training, where volunteers consume known amounts of cannabis using combustion, edibles, drinks, and extract formulations. During these trainings, Extract-ED collects oral fluid samples at various time points after consumptions of cannabis products. These samples are tested by Forensic Fluids Laboratories to measure the presence or absence of delta-8/9/10-THC. Extract-ED compares the concentrations of these substances in oral fluid to the consumers' performance on field sobriety tests (FSTs). This presentation helped visualize the data and information collected on cannabis consumers, oral fluid concentrations, and performance on the FSTs.

- **Methamphetamine and Fentanyl: Toxicology Trends, DRE Evaluations, and Testimony**
  - Curt E. Harper - Alabama Department of Forensic Sciences
  - Robert Lockwood - Alabama Department of Forensic Sciences
  - Paul D. Thompson - Alabama Law Enforcement Agency

This presentation helped to equip law enforcement and toxicology professionals with tools and knowledge to better address the complexities of DUID cases involving methamphetamine and fentanyl. Current and emerging roadside oral fluid detection devices were reviewed for these targets along with a 7-year analysis of concentration levels and usage patterns. Month-by-month prevalence for 2024-2025 was highlighted and DRE case studies involving these substances in combination where oral fluid and blood were analyzed were included.

Presentations and Workshops from the 2025 SOFT Annual Conference:

- **WS12: Roadside Oral Fluid Testing Device Evaluation and Approval**
  - Chair: Curt E. Harper, Ph.D. - Alabama Department of Forensic Sciences
  - Chair: Mandi Mohr, MS - The Center for Forensic Science Research and Education
  - Presenters: Suman Rana - ThinkTox, Mandi Mohr, and Curt Harper

This workshop outlined the differences between roadside and laboratory oral fluid testing, with a focus on their respective roles in Driving Under the Influence of Drugs (DUID) investigations. It covered key evaluation criteria used to assess roadside oral fluid testing devices and explained the steps involved in their evaluation and approval. Attendees examined currently available roadside oral fluid testing devices and reviewed relevant research to better understand the published literature, latest developments, practical considerations, and ongoing challenges in the field.

Oral Fluid Committee: Presentation Updates

- **S-01 The Effect of Vaporized and Oral Δ8-Tetrahydrocannabinol vs Δ9-Tetrahydrocannabinol on Pharmacokinetics and Pharmacodynamics in Healthy Adults**
  - Presenter: C. Austin Zamarripa - Johns Hopkins University

This controlled human laboratory study aimed to characterize subjective, behavioral, physiological and PK effects of vaporized (sub-study 1) and oral (sub-study 2) Δ8-THC, compared to vaporized/oral Δ9-THC and placebo. Healthy adults (sub-study 1: N=8; sub-study 2: N=7) completed four double-blind, outpatient drug administration sessions during which they self-administered Δ8-THC (30mg, 60mg), Δ9-THC (30mg), or placebo. Outcome measures were assessed at baseline and over 6 (vaporized) or 8 (oral) hours post-administration and included: self-reported drug effects, cognitive and psychomotor assessments, simulated driving performance, standardized field sobriety tests (SFSTs), and physiological outcomes. Blood, urine, and oral fluid specimens were obtained to characterize PK of Δ8-THC, Δ9-THC, and their metabolites.

- **S-35 Rapid Sample Preparation and Screening of Gabapentin in Oral Fluid Using LDTD-MS/MS**
  - Presenter: Mégane Moreau - Phytronix Technologies Inc.

The objective of this study was to develop a rapid sample preparation method for the extraction of gabapentin from the Quantisal device used for oral fluid collection. Additionally, in the context of rapid drug screening, a Laser Diode Thermal Desorption–Tandem Mass Spectrometry (LDTD-MS/MS) method was developed. The combination of LDTD with a QTrap 5500 mass spectrometer system from Sciex enables ultra-rapid (10 seconds per sample) screening of gabapentin in oral fluid. This method offers a rapid screening option for drug testing at roadside checkpoints using mobile crime labs equipped with mass spectrometers, as implemented by CEAEQ (Québec City) with TAGA unit and recently reported in Italy by Sciex and Forensic Lab Service (Soledad Poetto et al. (2024)).

Submitted by *Kristin Umstead*

SSRI Antidepressants

SOFT-DFC Snapshots are short reports of critical information about the more common drugs associated with drug-facilitated crimes (DFCs). They are not complete literature reviews about the drug or drug class. One key aspect is their focus on the ability to detect a drug after a single-dose administration, as is often the situation in DFC investigations. As such, these summaries also point out instances in which available data is limited in the hopes that this will encourage further research studies. Finally, SOFT-DFC Snapshots point to the use of these drugs in actual DFC cases, as cited in the medical and open literature.

Selective serotonin reuptake inhibitors (SSRIs) are a class of medicines indicated for the treatment of chronic depression, anxiety, and other mood disorders.1 Development of SSRI compounds began in the 1970s as researchers began to seek safer alternatives to the tricyclic antidepressants (TCAs) and monoamine oxidase inhibitor (MAOI) compounds.2 SSRIs entered the market in the United States in 1987 with Fluoxetine, marketed as Prozac.2 Additional SSRIs were developed in the years following.

As the name suggest, SSRIs work by inhibiting presynaptic reuptake of serotonin at serotonin transporters resulting in elevated levels of serotonin in the synaptic cleft.3 In addition SSRIs are distinct in that they have little to no effect on other neurotransmitters such as dopamine and norepinephrine, and have been noted to have fewer adverse side effects such as sedation and cognitive impairment. 2,3,4

Although SSRIs may be a common finding within DFC toxicology results, there is little impact on the contribution of intoxication either alone or in combination with other drugs and alcohol.5 This summary may be useful for interpreting the impact of toxicology findings when evaluating DFC casework.

Drug Class: SSRI antidepressant

Table 1: Generic and brand names, common dosages

Generic Names	Brand Names	Dose (mg)	Recommended (mg, qd)
Citalopram	Celexa®	10, 20, 40	20
Escitalopram	Lexapro®	5, 10, 20	10
Fluoxetine	Prozac®	10, 20, 40	20
Fluvoxamine	Luvox®, Luvox CR®	25, 50, 100	50
Paroxetine	Paxil®, Paxil CR®, Pexeva®	10, 20, 30, 40	20
Sertraline	Zoloft®	20, 50, 100	50
Vilazodone	Viibryd®	10, 20, 40	20

FDA Approval:

The SSRI compounds listed in table 1 are approved for the therapeutic treatment of depression, anxiety, and other mood disorders.[1], [6] Off label uses can include the treatment of migraines, premature ejaculation, chronic pain, paraphilic disorders and hypersexuality.[6]

SSRI Antidepressants

Pharmacological Effects:

Exogenous serotonin synthesis primarily occurs in the enterochromaffin cells of the gut. Neuronal cells transport serotonin across the membrane and store the serotonin for release under neuroexcitatory conditions. SSRIs work to increase serotonin in the synapse by inhibiting the reuptake of serotonin into the neuron, creating a prolonged period of time in which serotonin may bind to postsynaptic receptors.

While SSRIs are generally well tolerated slight differences between the SSRI drug structures may result in variations in the potential side effects of the compounds. Common side effects of SSRI compounds can include upset stomach, vomiting or diarrhea, and sexual dysfunction.[7]

SSRI drugs used in conjunction with other SSRIs, serotonin-norepinephrine reuptake inhibitors (SNRIs), or other compounds that can increase serotonin levels, may increase the risk of developing serotonin syndrome.[8] Serotonin syndrome is a potentially fatal condition characterized by too much serotonin in the body. Effects of serotonin syndrome include changes to mental status such as agitation, mania, confusion, dizziness, and hallucinatiosn, as well as physical effects such as respiratory failure, weakness, trembling, and hyperthermia.[7] [8]

Metabolism/Elimination:

SSRIs tend to have a relatively long half-life in comparison to other common drugs, ranging from approximately 15 hours for fluvoxamine to approximately 36 hours for citalopram.[9] While most drugs may persist in blood anywhere from a few to several hours, SSRIs and their desmethyl metabolites can last for days after the last dose. SSRI compounds are primarily metabolized in the liver by various cytochrome P450 (CYP) enzymes. In addition, some SSRIs such as paroxetine, fluvoxamine, and fluoxetine inhibit the function of one or more CYP enzymes.[9] This can easily disturb the pharmacokinetics of other co-ingested substances such as antibiotics, antifungals, certain anti-hypertensive medications, especially herbal supplements like St. John's Wort, which is marketed as a natural remedy for treating depression, as well as inhibit the metabolism of other SSRI compounds.[9] [10]

Single Dose Studies:

Urine:

Single dose studies of SSRIs in urine are rare. One case study compared the pharmacokinetics of vilazodone in patients with renal impairment to patients with normal renal function.[11] A single 20 mg dose of vilazodone was given to 32 partiticpants. Vilazodone was detectable in the urine of all 32 subjects 6-24 hours after the initial dose and measurable in 19 of 32 partcipants 72-96 hours after the single dose.[11]

SOFT DFC committee guidelines currently recommend a minimum method performance limit of 10 ng/mL in urine for citalopram, escitalopram, fluoxetine, paroxetine, and sertraline. Fluvoxamine and vilazodone are not currently included in the guideline documents.

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Blood/Plasma/Serum:

Citalopram: A study characterized citalopram after a 20mg oral dose in the plasma of 12 healthy Chinese volunteers. The researchers observed a mean peak concentration of 33.0 ng/mL at a median time of 3 hours.[12]

Another study compared the pharmacokinetics of 60 mg of citalopram administered as a tablet and as an oral solution in 24 healthy participants aged 18-35 years old.[13] Review of the plasma from the participants showed no significant difference in the mean concentration or time to peak concentration between the oral solution and tablet form.[13] In addition, while the researched dose was three times higher than that of the recommended clinical starting dose, the participants reported limited mild to moderate adverse events; no serious adverse effects were reported.[13]

Escitalopram: A single 20 mg dose of escitalopram was studied in 19 healthy patients who experienced monetary loss, as a way of monitoring the effectiveness of acute antidepressant therapy for gambling addiction. In this small population, the ages ranged from 22 to 26 years old, with body mass index range between 21 to 25 kg/m^2. Mean plasma levels of escitalopram were in the expected range of 23 ± 6 ng/mL approximately 3–4 hours after drug administration.[14]

Fluoxetine: In a 2-period crossover study, 24 healy male subjects were randomly dosed with either 20 mg of a proprietary solution of fluoxetine hydrochloride or a reference solution of fluoxetine.[15] After a 35 day washout period the study was repeated with the subjects receiving the opposite solution as originally dosed. Mean plasma levels for the majority of the participants were 11.786 ng/mL and 11.754 ng/mL for the proprietary fluoxetine hydrochloride and the reference fluoxetine respectively.[15] In addition, a Tmax of 5.48 hours for the proprietary fluoxetine hydrochloride, and a Tmax of [6].[26] hours for the reference fluoxetine were noted.[15]

Vilazodone: A case study investigated the pharmacokinetics of vilazodone in patients with impaired renal function. 32 subjects ages 18-70 with a mean age of 56.4-63.9 years were given a single dose of 20 mg vilazodone.[11] Of the 32 participants, 16 subjects with either mild or moderate renal impairment were matched with subjects with normal renal function. The study found that the pharmacokinetics of vilazodone in participants with renal impairment did not differ significantly from the participants with normal renal function.[11] Mean plasma levels of vilazodone were noted as 33.0-39.3 ng/mL in participants with renal impairment and 31.8-34.8 ng/mL in the matched subjects with normal renal function.[11] Vilazodone was measureable in the plasma in 17 of the 32 participants after the final sample time of [144] hours.[11] No serious adverse side-effects were reported.[11]

Case reports:

SSRIs are widely used antidepressants that are often safer than alternatives, but may produce a variety of cutaneous reactions including spontaneous bruising, pruritus, urticaria, angioedema, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, erythema nodosum, alopecia, hypertrichosis, leukocytoclastic vasculitis, and an acneiform eruption. These effects are particularly seen in patients treated with paroxetine, which is the strongest and the most selective of the inhibitors.[16] Forensic examiners may notice bruising and bleeding that may or may not be evidence of tissue damage from a violent assault. Therefore it is important to be aware of these toxicology findings in reconciling with the context of the incident.

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In one example, a 32-year-old woman with a cutaneous eruption composed of painless petechiae and yellow, blue, and brown bruises on both legs and anterior aspect of thighs. These findings occurred during paroxetine treatment for about 2 months at the daily dose of 20 mg and were preceded by general malaise, shivering, fever, and diarrhea. This patient had simultaneously taken oral contraceptives, which she discontinued because of midcycle spotting.[17]

A case report from 2001 included a 36- year- old woman diagnosed with major depression with onset around the fourth postpartum month. Psychopharmacologic treatment commenced after the completion of breast-feeding. She was started on citalopram 20 mg daily and had a partial clinical response so, her dose was increased to 40 mg daily. Although she reported significant improvement by the tenth week of treatment, she also reported bothersome sexual dysfunction side effects along with new onset of easy bruising. After switching other medications, her sexual dysfunction persisted, but her symptoms of easy bruising ceased after the citalopram was discontinued.[18]

SSRI and other antidepressant drugs are not uncommon findings in toxicological analysis of samples associated with DFCs. [4] [19] One review suggests that the detection of SSRI antidepressant in the blood of sexual assault victims likely reflects use consistent with the victim's prescription therapy.[4] A separate review of drug facilitated sexual assaults (DFSA) in Australia noted that antidepressants are the most frequently prescribed mental health medication and that females are more likely to possess a prescription for an antidepressant. [20] The researchers postulated that females using antidepressants therapeutically may be at a higher risk of drug-interactions caused by dosing incident associated with drug-facilitated crime. [20]

It is important to note that many reviews of DFSAs do not distinguish SSRI drug compounds from other, potentially more impairing, antidepressants. In addition, studies examining the involvement of SSRIs in DFSA are currently lacking.

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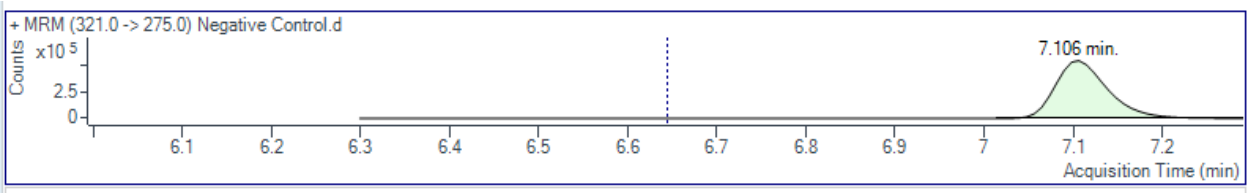
Isotopic Interference: Considerations for Deuterated Internal Standards in Benzodiazepine Analysis

Submitted by Robert Lockwood - Applied Analytical Committee

When evaluating a negative control, an unexpected instrumental signal in a liquid chromatography tandem mass spectrometry (LC-MS/MS) multiple reaction monitoring (MRM) chromatogram can easily be attributed to endogenous compounds present in the matrix. What happens, though, if the instrumental signal was the result of your own doing?

During the review of a laboratory's LC-MS/MS method for the confirmation and quantitation of benzodiazepines in biological matrices, a large instrumental signal was consistently noted in the MRM chromatogram of lorazepam around 7.11 min in the negative control. The expected retention time for lorazepam for the method was roughly 6.65 min, see Figure 1. The retention time of the instrumental signal in the negative control was outside the laboratory's retention time acceptance criteria of ±3 % and therefore not identified by the software as lorazepam. However, if the chromatographic conditions were to change (e.g., column age), this instrumental signal has the potential to create an interference, resulting in the possible failure of the negative control. Other considerations would be that a change in the laboratory's acceptance criteria or data analysis processing parameters might create a scenario where this instrumental signal could be identified by the software as lorazepam.

Figure 1: MRM chromatogram for lorazepam (expected retention time of 6.649 min) with a significant instrument signal at 7.106 min



After investigation, the "culprit" was, in fact, one of the internal standards within the analytical method, clonazepam-D4. The [M+H]+ for clonazepam-D_4 is 320 m/z with the precursor and product ions both 1 Dalton less than ions for lorazepam, see Table 1.

Table 1: MRM Transitions for Lorazepam and Clonazepam-D_4

Compound	Transition *(m/z)*
Lorazepam	321 → 275
Clonazepam-D_4	320 → 274

While the average molecular weight of clonazepam-D_4 and lorazepam differ, the natural contribution from ^{13}C generates a precursor overlapping in mass with the base mass of lorazepam; the two compounds also generate many common fragment masses when using collision induced fragmentation.

Isotopic Interference: Considerations for Deuterated Internal Standards in Benzodiazepine Analysis

This LC-MS/MS assay utilizes 12 deuterated internal standards that are paired with the non-deuterated target drug. As shown in Table 2, some of these internal standards share a monoisotopic mass with other analytes within the assay.

Table 2: Possible MRM Interferences Based Solely on [M+H]+

Internal Standard	$[M+H]^+$ (*m/z*)	Possible Isobaric Interferences
Chloriazepoxide-D_5	305	Delorazepam
Alprazolam-D_5, Zoldidem-D_6	314	Flunitrazepam
Midazolam-D_4	330	Meclonazepam
Temazepam-D_5	306	Zaleplon

Another potentially complicating factor, specifically impacting the analysis of drugs in the benzodiazepine class, is the frequent incorporation of chlorine and bromine atoms into their chemical structures. Both chlorine and bromine possess two predominant natural stable isotopes two mass units above the base or monoisotopic mass (M+2), roughly 24% for chlorine-37 and approximately 49% for bromine-81. These isotopic variations are substantial enough to require critical consideration in analytical methods for identification or quantitation of benzodiazepines. The considerations regarding the natural isotopic abundance of chlorine and bromine also apply to deuterated internal standards. For compounds such as lorazepam and triazolam which contain multiple chlorines, the isotopic spectrum becomes even more complex, impacts a wider molecular weight range, and is more substantial; the presence of two chlorine atoms shifts the abundance of the peak at M+2 (from the $^{35}Cl^{37}Cl$ isotope) is nearly as intense as the peak corresponding to the lower mass isotope. With tandem mass spectrometry, the specific molecular fragmentation of both the analyte and the internal standard will determine if an isobar is erroneously detected in the transition of another molecule. Understanding the structures of all monitored fragments and then factoring in the mass contributions from the isotopes will enable you to predict interference and/or to select transitions lacking the potential for interference from isotopes of other internal standards.

Table 3 – Possible MRM Interferences due to Natural Isotopes of Chlorine

	Molecular Ion inclusive of			
Internal Standard	**1 x ^{35}Cl**	**1 x ^{37}Cl**	**2 x ^{37}Cl**	**Possible Isobaric Interferences**
Alprazolam-D_5	314	316	-	Bromazepam, Clonazepam
Lorazepam-D_4	325	327	329	Flualprazolam
Temazepam-D_5	306	308	-	Zolpidem
Triazolam-D_4	347	349	351	Phenazepam

Isotopic Interference: Considerations for Deuterated Internal Standards in Benzodiazepine Analysis

Isotopic interference is not exclusively one way. When multiple halogens are present in an analyte (again as is the case with lorazepam and triazolam) there is a risk of having the analyte itself contribute to the response of the internal standard. In this situation the $^{37}Cl_2$ isotopes of lorazepam and triazolam shift the mass +4 AMU units and overlap with the mass of the base isotopes for their respective D_4 internal standards ($^{35}Cl_2D_4$-lorazepam and $^{35}Cl_2D_4$-triazolam). Luckily the existence of the heavier isotopes also provides a simple solution to this problem. By shifting the monitored mass of the internal standard 2 or 4 AMU higher and targeting the $^{35}Cl^{37}Cl$ or $^{37}Cl_2$ isotopes, the monitored masses for the internal standards are then cleared away from isotopic contributions of the analyte.

As shown in Table 3, if chromatographic conditions are not appropriately optimized, the "spiked" internal standards have the potential to produce an isobaric interference to a monitored analyte that a low-resolution mass spectrometer (LC-MS/MS) cannot adequately resolve. The more deuterated internal standard used in an analytical method, the odds are "weighted" (pardon the pun) against you that you may have a pair of peaks with monitored masses that overlap. It may be attractive for a laboratory to sacrifice optimal chromatographic separation for a shorter analytical run time. The lack of chromatographic separation puts the onus on the mass spectrometer to "do the work" of separating the targets and internal standards. Given the limitations associated with resolution of isobaric compounds using low resolution instrumentation, effective chromatography is the best option to save the day! Not only does this highlight the importance of chromatographic optimization, but also the importance of internal standard interference studies during method development and validation. By injecting, one-by-one, reference standards containing individual analytes and internal standards, the presence of inter-analyte interference can be detected as erroneous peaks in the transitions of the other analytes.

If you found this article helpful, please know that our committee is in the process of developing a database of interferences, similar to the tables above. We hope it will be a useful resource during validation and/or troubleshooting.

Evaluation of Drug Stability in the Quantisal ™ Oral Fluid Collection

Sarris, Gregory G and Limoges, Jennifer F
Submitted on behalf of the SOFT/AAFS Oral Fluid Committee

Abstract: Drug stability was evaluated in authentic human oral fluid specimens collected from drug users with the Quantisal™ device. Specimens were stored at 2 – 8°C for the duration of the study and analyzed over a 12-week period. Analysis was performed using previously validated liquid-chromatography/tandem mass spectrometry methods which are compliant with Tier I recommendations established by the National Safety Council's Alcohol, Drugs and Impairment Division. Results indicated that cocaine, clonazepam, 7-aminoclonazepam, 6-acetylmorphine, and Δ9-THC demonstrated instability over the course of this study. This study did not examine stability prior to submission and initial testing.

Background/Objective: Oral fluid has become a desirable drug testing matrix in several disciplines of forensic toxicology, with an increased focus on driving under the influence of drugs (DUID) investigations. Oral fluid provides interpretative advantages over urine, primarily a drug detection window more proximal to drug use and a closer relationship with blood concentrations.

As with any matrix, drug stability can impact testing and interpretation. Most oral fluid stability studies utilize fortified samples and only test for ~30 days. However, in DUID testing, many laboratories may not complete testing in 30 days, and independent analysis may be needed at an even later time point. So, the toxicology section of the New York State Police Forensic Investigation Center conducted a study to evaluate drug stability in authentic human oral fluid specimens using the Quantisal™ device. This study was performed under refrigerated conditions (i.e. 2 – 8°C) and over various time intervals. A comprehensive review of published stability data was also performed and compared to experimental results.

Methods: Oral fluid specimens were obtained from drug users during Drug Recognition Expert field certification training and stored refrigerated upon submission to the laboratory. Specimen analysis involved solid-phase extraction (SPE) techniques and liquid chromatography-tandem mass spectrometry (LC-MS/MS) instrumentation. Analytical methods were previously validated to ANSI/ASB Standard 036 (1st edition) Standard Practices for Method Validation in Forensic Toxicology[1] to be compliant with 2021 Tier I DUID recommendations for scope and sensitivity[2], and additionally included PCP and Δ8-THC.

After initial analysis, certain specimens were selected for stability assessment based on the presence of analytes known to be unstable (e.g. cocaine, 6-acetylmorphine, Δ9-THC), and those in which limited stability data exists in literature (e.g. oxycodone, alprazolam). The designated time intervals are described in Tables 1 and 2. Initially, basic/neutral analyte stability was tested for 8 weeks in set BN1, and this window was extended to 12 weeks for a second set of samples BN2. Cannabinoid stability evaluations were extended to 12 weeks with 4-week intervals after set C1 demonstrated sufficient stability for 8 weeks.

Evaluation of Drug Stability in the Quantisal ™ Oral Fluid Collection

Table 1: Basic/neutral drug stability sample sets

Sample Set #	# of Samples in Study	Time Elapsed (Collection vs. Initial Testing)	Study Length	Testing Interval
BN1	11	~4 Weeks	8 Weeks	2 Weeks
BN2	12	~5 Weeks	12 Weeks	2 Weeks

Table 2: Cannabinoid drug stability sample sets

Sample Set #	# of Samples in Study	Time Elapsed (Collection vs. Initial Testing)	Study Length	Testing Interval
C1	8	~4 Weeks	8 Weeks	2 Weeks
C2	8	~5 Weeks	12 Weeks	4 Weeks
C3	7	~4.5 – 5 Weeks	12 Weeks	4 Weeks
C4	6	~4 Weeks	12 Weeks	4 Weeks

Three-point semi-quantitative calibration curves were established for each analyte using the low, medium (med), and high controls. Low controls represented Tier I cutoffs plus PCP at 10 ng/mL and Δ8-THC at 1 ng/mL, medium controls were set at 5 times the low control, and high controls were set at 10 times the low control. Semi-quantitative analytical results at various time intervals were compared to the initial testing results (T=0), and the percent change in approximate concentration was calculated over time. A decrease in approximate concentration of >20% was considered to be unstable.

Results: A total of 17 different analytes were evaluated over the course of the study. Results for each analyte are organized by concentration range and summarized below. Tables 3 & 4 describe basic/neutral analyte and cannabinoid stability results, respectively. Table 5 provides a general summary of false negative results due to analyte instability.

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Table 3: Basic/neutral analytes – Average stability results

Analyte	Conc. Range	Average % Change (Weeks) vs. T=0*							
		n	*T=2*	*T=4*	*T=6*	*T=8*	*n*	*T=10*	*T=12*
Cocaine	Low - Med	3	-1.1	-7.3	-12.6	-17.0	1	-21.1	-28.7
	Med - High	2	-9.6	-7.6	-17.9	-23.8	1	-28.9	-41.8
	>High	5	-6.0	-3.6	-11.8	-21.7	2	-27.2	-38.2
Cocaethylene	Low - Med	1	+3.0	+3.5	-10.4	-13.7	0	NA	NA
Benzoylecgonine	Low - Med	4	+6.3	+13.4	+20.5	+21.3	1	+56.2	+44.6
	>High	4	-2.3	+8.5	+10.2	+12.2	2	+38.2	+35.1
Alprazolam	Low - Med	2	-3.8	+1.9	-0.3	+1.0	2	-7.8	+1.2
Clonazepam	Low - Med	1	-6.8	<LOD	<LOD	<LOD	0	NA	NA
7-aminoclonazepam	Low - Med	1	-13.8	<LOD	<LOD	<LOD	1	<LOD	<LOD
	>High	1	-11.4	-20.0	-28.1	-49.5	0	NA	NA
Amphetamine	Low - Med	2	+4.3	+3.9	-12.2	-0.1	1	+5.6	-4.6
	Med - High	2	+0.5	+8.7	-8.9	+1.9	0	NA	NA
Methamphetamine	Low - Med	3	+3.2	+8.0	-4.4	+9.1	3	+4.9	-7.7
	Med - High	4	+7.9	+15.5	-3.2	+16.0	3	+12.7	-1.5
	>High	2	+4.8	+10.3	-2.1	-1.5	1	+11.3	-7.7
Morphine	Low - Med	1	-2.1	-2.0	-0.6	+7.9	1	+13.5	-11.1
6-acetylmorphine	Low - Med	3	+4.6	-0.5	-5.6	-4.2	3	-7.5	-20.9[t]
	>High	1	-12.2	-7.3	-21.1	-15.4	1	-23.1	-29.4
Oxycodone	>High	1	+13.8	+24.8	+24.9	+8.5	0	NA	NA
Fentanyl	Low - Med	3	-2.3	+9.2	+2.1	-4.4	0	NA	NA
Methadone	Low - Med	1	-9.3	+5.7	+3.0	+4.9	1	+6.5	+2.2
	Med - High	1	+6.6	+13.2	+3.1	+5.0	0	NA	NA
	>High	1	+7.6	+9.9	+1.1	+1.9	0	NA	NA
Tramadol	Low - Med	2	-3.7	-1.3	-4.4	+1.8	2	-0.3	-5.9
Phencyclidine	Low - Med	1	-2.6	+10.0	-10.8	+0.5	1	-1.5	-12.2

*Red font indicates a stability issue

[t]One replicate omitted because result was <LOD

NA = not applicable

<LOD = below the cutoff

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Table 4: Cannabinoids – Average stability results

Analyte	Conc. Range	Average % Change (Weeks) vs. T=0*									
		n	*T=2*	*n*	*T=4*	*n*	*T=6*	*n*	*T=8*	*n*	*T=12*
Δ^9-THC	Low - Med	6	-4.7	10	-7.8	6	-6.5	10	-10.1	4	-14.2
	Med - High	0	NA	3	-11.4	0	NA	3	-21.8	3	-29.0
	>High	1	-4.0	11	-11.9	1	-4.0	11	-12.3	9	-10.6
Δ^8-THC	Low - Med	0	NA	2	+3.3	0	NA	2	+8.7	2	-4.2
	Med - High	0	NA	0	NA	0	NA	0	NA	0	NA
	>High	0	NA	5	-8.4	0	NA	5	+0.3	5	-1.8

*Red font indicates a stability issue

Table 5: False-negative results throughout study due to analyte instability

Analyte	Conc. Range	# Samples With False Negative Results Throughout Study							
		n	*T=2*	*T=4*	*T=6*	*T=8*	*n*	*T=10*	*T=12*
Clonazepam	Low - Med	1	0	1	1	1	0	NA	NA
7-aminoclonazepam	Low - Med	1	0	1	1	1	1	1	1
6-acetylmorphine	Low - Med	3	0	0	0	0	3	0	1

Discussion/Conclusions: Stability studies in literature using the Quantisal™ device predominately involve the fortification of blank human oral fluid matrix with various compounds of interest and stability is evaluated in a controlled environment over time[3 – 7]. These studies are typically performed within a 30-day range, although up to 90 days has been reported8. Device manufacturer data is also available with a time frame of up to 12 months for a wide range of compounds[10,11]. Some published studies did not include relevant storage conditions (e.g. refrigeration, room temperature), which may be crucial to the interpretation of oral fluid testing results[3,4].

The study design described here provides complimentary data on oral fluid drug stability in a realistic laboratory setting. First, the analysis of authentic specimens collected from drug users mimics routine casework, accounting for unknown variables including illicit and therapeutic drug co-administration, food intake, health status, and the extensive inter-individual variability in oral fluid composition. Also, specimen handling typically varies in the collection, storage, and time elapsed until laboratory submission. The period between laboratory submission and testing must also be considered. This may depend on factors such as backlog, staffing, budget, and analytical capabilities. Therefore, specimen analysis may occur several weeks after collection.

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When evaluating average data trends, stability was adequate for 12 weeks after initial testing for all analytes except cocaine, clonazepam, 7-aminoclonazepam, 6-acetylmorphine, and Δ9-THC. No relevant trends relating analyte stability to approximate concentration range were observed. Stability results for some analytes within a specific data set (e.g. same concentration range and time of analysis) demonstrated noticeable variability, where some individual percent changes indicated instability, and others did not. Although analytical variability may be a factor, this observation could potentially represent an inherent fluctuation in analyte stability across specimen donors. A similar observation was made in another stability study which involved the analysis of oral fluid samples collected from actual cannabis users[9].

In controlled literature and manufacturer studies, cocaine demonstrated poor stability within 7 days post-collection at room temperature[5 – 7,10], which may represent specimen storage and transport to the laboratory in a realistic setting. Stability significantly improved with refrigeration, although minor degradation was observed in refrigerated samples at 30 days[6,7,10]. In the current study, specimens showed reasonable consistency in stability trends across concentration ranges, where losses were near or above the 20% threshold by the 8-week time frame. No false negatives were observed throughout the study, although approximate benzoylecgonine concentrations increased over time in both the low – med and >high concentration ranges. This occurred at a rate similar to the overall decreases in cocaine levels, which is a potential result of cocaine conversion to benzoylecgonine. A similar trend was observed by Riggio et al over 30 days, although only at room temperature and 37°C storage conditions[7].

Clonazepam and 7-aminoclonazepam demonstrated the most immediate stability issues, with >20% losses and false negative results occurring at 4 weeks after initial testing. Limited data exists in literature to characterize the stability of these compounds in the Quantisal™ device, and a further complicating factor is that refrigerated stability results for clonazepam vary from -4% to -56% at 30 days[4,6].

6-acetylmorphine demonstrated adequate stability in published studies at room temperature 7 days post-collection, and degradative losses appeared within 14 days. Refrigeration effectively maintained analyte stability for a minimum of 30 days[5,6], and up to 12 months in manufacturer studies[10]. Results of the current study indicated that 6-acetylmorphine was stable for 4 weeks after initial testing. At the 6-week timeframe, the single data point in the >high concentration range indicated instability, although this fluctuated around the stability threshold throughout the study. By the 12-week timeframe, 6-acetylmorphine results were consistently below the stability threshold across both concentration ranges. Interestingly, the single 6-acetylmorphine >high and morphine low – med data points were from the same sample, and the decreasing 6-acetylmorphine levels did not correlate to an increase in morphine levels.

Similar to cocaine, Δ9-THC instability has been reported in specimens stored at room temperature within 7 days, and refrigeration significantly reduced degradation[5,6,10,11]. In the study presented here, Δ9-THC demonstrated a counterintuitive trend where the average med – high results decreased below 20% within 8 weeks. This trend was not observed in the low – med, >high, or any Δ8-THC data set. Overall, THC isomer stability was better than expected, especially when considering the ~16-week timeframe after specimen collection. These results complimented Lee et. al.'s findings, demonstrating that Δ9-THC degradation is minimal over long periods of time in the Quantisal™ device when authentic specimens are stored refrigerated[9].

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Overall, analyte stability in oral fluid samples may be a critical factor in the interpretation of test results. Specimen collection date, handling, storage, and analysis date must be considered, along with the analytes in the testing panel. The results presented here, provided by the manufacturer, and published in literature demonstrate that analyte stability is generally adequate within a reasonable timeframe after collection when Quantisal™ specimens are stored properly. Refrigerated storage provided superior stability, in contrast to room temperature or freezer conditions[3,6]. Variable results within a concentration range and analysis time were seen, which is consistent with Lee et. al.'s observations. Since current stability knowledge is reliant on fortified specimens in a controlled environment, additional studies involving the analysis of authentic specimens from drug users may be warranted to further characterize this phenomenon.

Limitations: An approximate time period of 4 – 5 weeks elapsed between sample collection and initial testing. Samples were collected over the week during DRE training and were typically delivered to the laboratory the following week. They were stored at room temperature prior to submission, and under refrigeration once at the laboratory. Therefore, this study does not account for potential analyte degradation prior to T=0. This may be particularly relevant for Δ9-THC and cocaine which showed significant losses within 7 days at room temperature[10,11]. Furthermore, averaged data across sample sets assumes a uniform analysis start date, although this date varied by approximately one week. This approach was taken to present the data in a concise and organized manner.

Data set size and concentration ranges were limited due to the nature of the training samples evaluated. As a result, stability findings and unusual trends may be reliant on only one or few data points and could impact conclusions. Further stability testing with a larger sample size may be warranted to corroborate the results of this study.

The validated methods are for qualitative analysis only, quantitation was not validated. Semi-quantitative results in this study are based on a linear calibration curve ($1/x^2$ weighting, ignore origin) using the three QC levels (1x, 5x, 10x cutoffs); the ">high" samples exceeded the highest calibration point. Semi-quantitative analysis of over 100 compounds in proficiency test samples showed all but one were within ±2 standard deviations (SD) of the mean (benzoylecgonine at 13.7 ng/mL, ±2 SD range 6.7-13.5), thus supporting that the semi-quantitative approach provides reasonable results for comparison purposes.

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7-Hydroxymitagynine: Not Your Garden Variety Kratom

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Psychoactive plants have been a source of fascination for centuries and have been incorporated into various cultures for spiritual and medicinal purposes. The botanical *Mitragyna* speciosa is a tree native to Southeast Asia. Traditional ethnobotanical use of includes chewing the leaves or brewing them into a tea, and these preparations have commonly been referred to as "kratom". Kratom has gained recent interest in the United States (US) over the past decade or so as a natural alternative to manage pain and symptoms of opioid withdrawal; this is due to kratom's opioid-like effects at high doses. Conversely, kratom purportedly has more stimulant-type effects at low doses, and users report benefits for energy and productivity. These biphasic effects may be tied to kratom's complicated pharmacology, as it has more than 50 known alkaloids which likely work on various biological targets. The primary alkaloid of kratom is mitragynine, a weak and partial mu opioid receptor agonist, that metabolizes to 7-hydroxymitragynine, which has more affinity and activity on opioid receptors comparatively. 7-Hydroxymitragynine is also a minor constituent of the kratom plant (<2%) and is generated post-harvest by the oxidation of mitragynine. Kratom has gained popularity in the US for its varying uses, and kratom derived products, including powders, capsules, tablets, edibles, and drink mixtures are sold commercially online, in smoke shops, and in some gas stations.

Kratom products are widely available across the US with little oversight or regulation, as they are typically marketed as dietary and herbal supplements, despite not being approved by the Food & Drug Administration (FDA). Kratom products have historically targeted mitragynine as the primary active alkaloid, with many products having higher concentrations of mitragynine compared to traditional applications. In addition to elevated doses of kratom alkaloids in products, there are typically no warnings or directions for safe use, so consumers are left to their own devices and internet communities for how to consume the products. With this large gap in scientific knowledge over safe dosing or use practices, it is of no surprise that there have been reported adverse events, including organ injury, seizures, and death, tied to use of kratom products, particularly at high mitragynine blood concentrations (>1000 ng/mL)[1]. With negative attention and media reports focusing on mitragynine as the common toxicological target for kratom use, combined with some users looking for a stronger kratom product, commercial sellers have shifted their focus to 7-hydroxymitragynine[2].

Targeting 7-hydroxymitragynine for commercial production requires extraction or synthesis, making these products semi-synthetically enhanced compared to natural kratom. 7-Hydroxymitragynine is an appealing alternative as the target alkaloid in these products because it is a high affinity mu opioid receptor partial agonist and considered more potent than mitragynine and other classical opioids, like morphine[3]. The Center for Forensic Science Research & Education (CFSRE) recently issued a public health alert after testing kratom products marketed as 7-hydroxymitragynine; all products contained 7-hydroxymitragynine as the primary component but also contained detectable amounts of mitragynine and mitragynine pseudoindoxyl (another kratom alkaloid more potent than mitragynine and subsequent metabolite) in addition to other kratom alkaloids (see Figure 1 for pictures)[4]. This work highlights an emerging shift in active substances in kratom-based products, a common tactic employed in the area of novel psychoactive substances (NPS).

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Figure 1: Commercial kratom-based products tested by the CFSRE that contained 7-hydroxymitragynine as the principal component[4]

Ideally, 7-hydroxymitragynine would be included with mitragynine in analytical toxicology testing. However, 7-hydroxymitragynine presents analytical challenges, including the presence of chiral centers and alkaloid isomers which would require appropriate chromatographic separation and specific identification with commercially available reference material. 7-Hydroxymitragynine is also notoriously unstable, especially in biological matrices, rendering accurate quantitation difficult to achieve and interpretation difficult to perform; studies showed significant drug loss after 8 hours at temperatures of 40°C and higher and after 7-days under refrigerated conditions (4°C)[5,6]. Even if quantitation was able to be achieved for 7-hydroxymitragynine, it could be difficult to elucidate its presence from metabolism vs synthesized product. Further, the type of instrumentation used for analysis may play a role in feasibility. In recent work from the CFSRE, the isomers 7-hydroxymitragynine and mitragynine pseudoindoxyl were indistinguishable by GC/MS and analysis via LC-QTOF-MS was required for identification and differentiation. The routine lack of inclusion of 7-hydroxymitragynine in toxicological testing is a concern, but pre-analytical and interpretative variables also pose significant and potentially prohibitive challenges for laboratories.

Postmortem investigations reporting mitragynine have been reported for years and now 7-hydroxymitragynine is adding to the complexity of kratom-involved deaths. Recently, the Travis County Medical Examiner (located in Austin, TX) identified three postmortem cases containing 7-hydroxymitragynine without the presence of mitragynine by LC-QTOF-MS and an LC-MS/MS quantitative method for mitragynine and 7-hydroxymitragynine. The first case involved a 24 y/o male found unresponsive in bed with vomitus on his face. Scene findings revealed an empty synthetic kratom four-tablet foil holder (Figure 2). The decedent had a history of cocaine and "synthetic kratom" use and often complained of losing his breath while sleeping. Autopsy findings revealed cerebral edema, pulmonary edema and congestion, and left ventricular hypertrophy, while femoral blood toxicology included 7-hydroxymitragynine (100 ng/mL), cocaine (120 ng/mL), benzoylecgonine (2300 ng/mL), ecgonine methyl ester (190 ng/mL), diphenhydramine (280 ng/mL), dextromethorphan (32 ng/mL),

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and no mitragynine. Upon further investigation of the scene photos, the empty foil packet was suspected to be "dozo Perks 7-OH Mitragynine Omnia Blend" either 50 or 100 mg tablets. Based on the autopsy, investigative, and toxicological findings the manner and cause of death was determined to be an accidental death due to the toxic effects of cocaine, 7-hydroxymitragynine, diphenhydramine, and dextromethorphan.

Case 2 was a 24 y/o male also found unresponsive in bed. No illicit or prescription drugs were found on scene, though the decedent had a self-reported history of cocaine use while drinking alcohol. Autopsy findings included cardiomegaly, cerebral and pulmonary edema. Femoral blood toxicology included 7-hydroxymitragynine (28 ng/mL), cocaine (32 ng/mL), benzoylecgonine (530 ng/mL), ecgonine methyl ester (170 ng/mL), ethanol (0.12% blood, 0.13% vitreous), and no mitragynine. Further investigation of the scene photos identified "ZOHM Extra Strength 7-OH Mitragynine Starburst Tablets (40 mg tablets)" in the decedent's bedside drawer (Figure 2).

A third postmortem case, involving a 36 y/o male found unresponsive in bed, identified mitragynine and 7-hydroxymitragynine by LC-QTOF-MS, but only 7-hydroxymitragynine had a reportable femoral blood concentration (73 ng/mL) along with ethanol (0.20% blood, 0.22% vitreous). Scene photos were unavailable and there were no reports of suspected kratom use, only that the decedent was supposedly "taking an unknown illicit substance". Cause and manner of death for cases 2 and 3 are still pending.

Cases 1 and 2 were initially analyzed for 7-hydroxymitragynine during validation for stability purposes. Initial 7-hydroxymitragynine femoral blood concentrations were 140 ng/mL and 53 ng/mL for case 1 and 2, respectively. Within nine days, after completion of validation studies, 7-hydroxymitragynine concentrations decreased 29% and 47%, respectively. All blood specimens were stored refrigerated prior to analysis and analyzed within 30 days (case 1), 25 days (case 2), and 10 days (case 3) after death.

Figure 2: Commercial 7-hydroxymitragynine products collected during death investigations. Note each pressed tablet in the "Zohm" product is listed as 40 mg and 12 servings.

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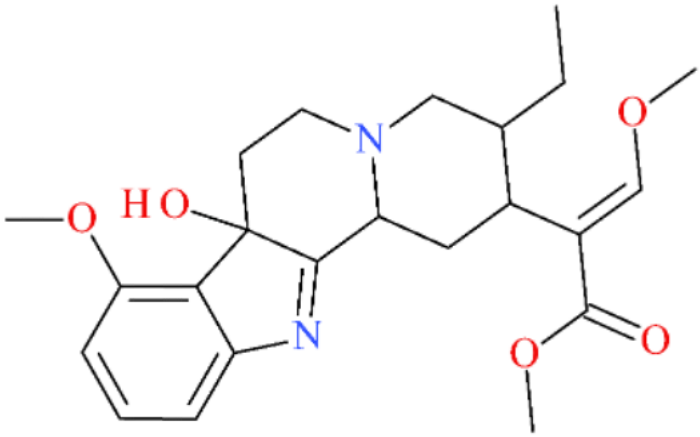
The FDA recently asked the Justice Department to schedule 7-hydroxymitragynine based on its pharmacological profile, abuse liability, and emerging pattern of non-medical use, therefore restricting or prohibiting access to these derived products [7]. This is an interesting development after an initial attempt by the Drug Enforcement Administration (DEA) to schedule mitragynine and 7-hydroxymitragynine in 2016 was retracted after public outcry, although it has been noted as a "drug and chemical of concern". Seven states have issued their own laws, but federal action has been limited to import bans on kratom-containing supplements[8]. There are vocal proponents for access to kratom in the US as a natural alternative for pain management, and regulation in this space has prompted fierce backlash. Commercial providers and sellers of kratom products face mounting scrutiny, but patchwork policies contribute to uneven enforcement.

Commercial sales of 7-hydroxymitragynine enhanced or adulterated kratom products exploit regulatory and toxicological testing loopholes. Adverse events linked to 7-hydroxymitragynine may be overlooked (due to variable testing protocols and instability) or incorrectly classified, with specific concern if mitragynine is not present or reported at low concentrations in a case. The regulatory effort behind scheduling 7-hydroxymitragynine may also result in the commercial market moving on to the next metabolic compound with increased activity and potency, such as mitragynine pseudoindoxyl or a synthetic product like dihydro-7-hydroxymitragynine (MGM-15)[9]. Comprehensive toxicology testing for kratom alkaloids, including mitragynine, 7-hydroxymitragynine, and mitragynine pseudoindoxyl, is critical in order to keep up with the state of the commercial kratom market and provide appropriate toxicological reporting in these cases[10]. Extensive investigative histories, including scene photographs of kratom-related products, bolster the efforts to accurately identify these cases, as evidence from the provided examples. Appropriate labeling, product characterization and psychoactive alkaloid content limits, dosing studies, and age restrictions could go a long way towards decreasing the risk profile associated with these products. Kratom consumers and toxicology laboratories should continue to monitor this space as kratom-based products continue to evolve.

Synonyms: 7-OH Mitragynine, 7-OHM



Structure of 7-hydroxymitragynine, (chiral centers are starred)

Molecular Weight: 414.5

[M+H]+: 415.2227

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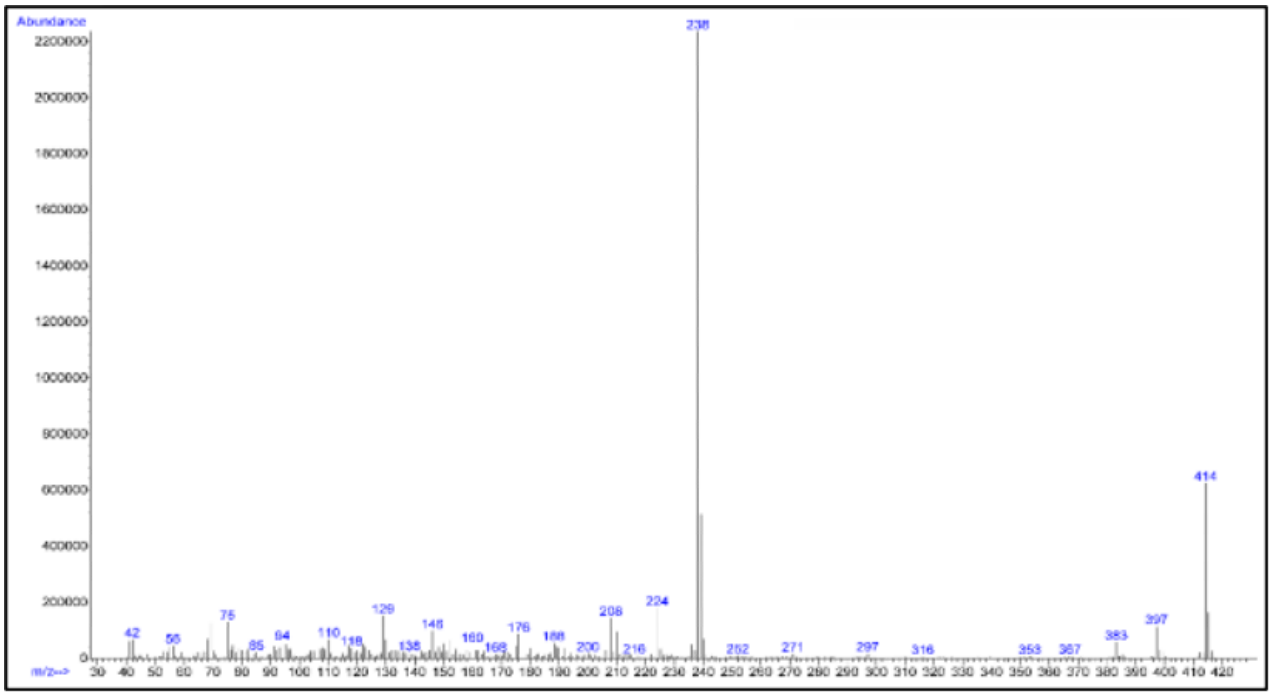
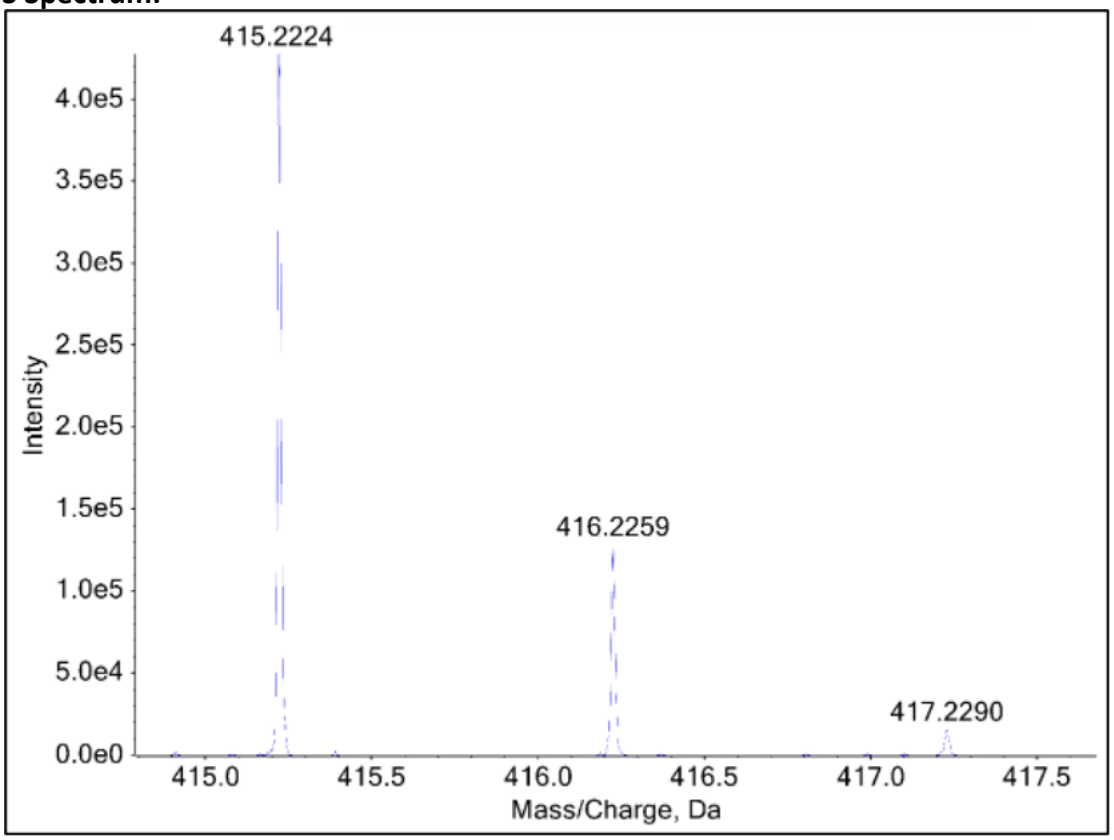
GC/MS Spectrum:



[Source: Agilent 5975 GC/MS, NPS Discovery, Center for Forensic Science Research & Education, PA]

LC-QTOF-MS Spectrum:



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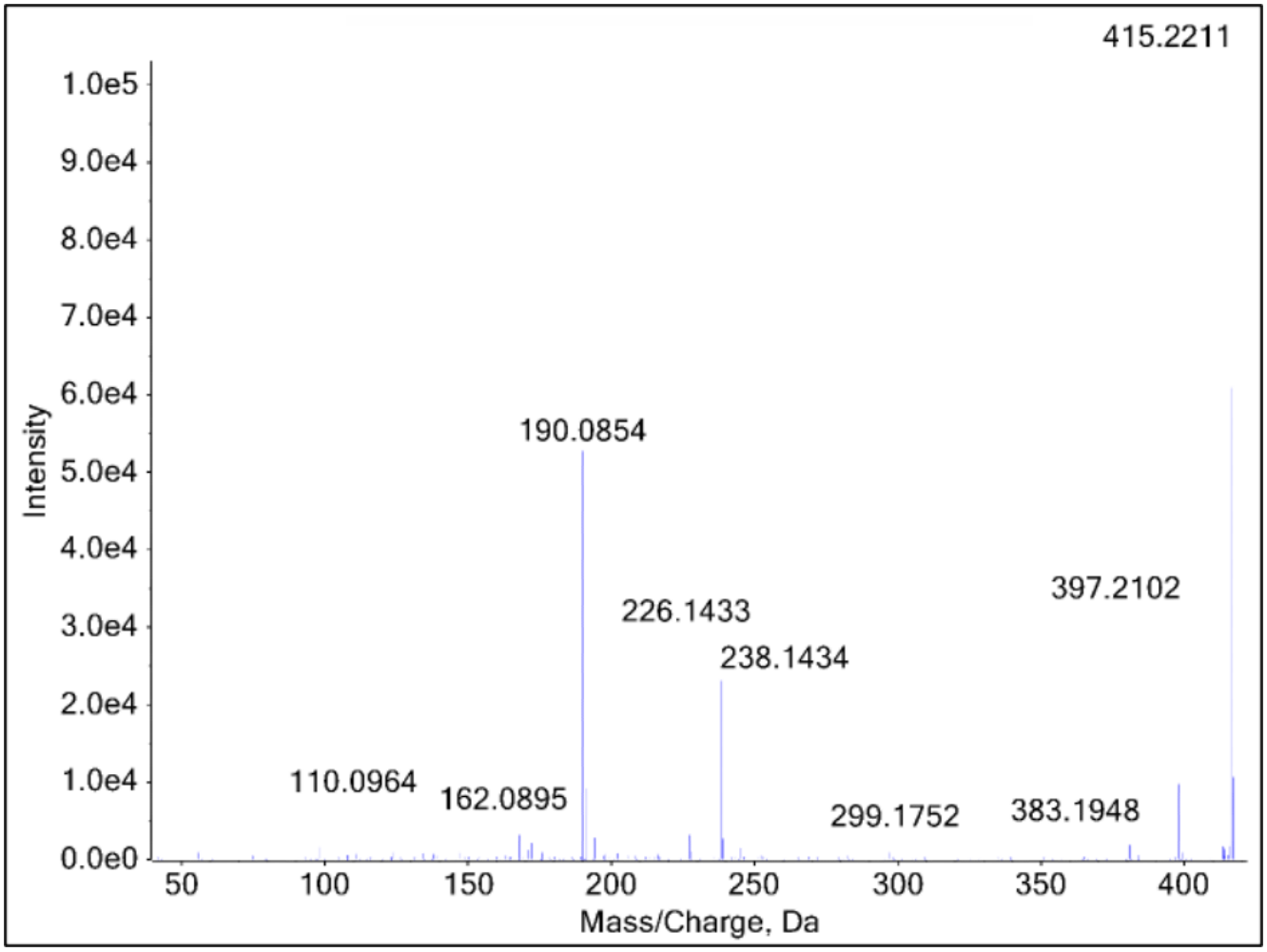

[Source: Sciex TripleTOF ® 5600+ LC-QTOF-MS, NPS Discovery, Center for Forensic Science Research & Education, PA]

Pharmacological Drug Class: plant alkaloid

7-Hydroxymitragynine: Not Your Garden Variety Kratom

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TOXTALK

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2026 PUBLISHING SCHEDULE
Issue 1: Due by Jan 30, Published week of Feb 23
Issue 2: Due by May 01, Published week of May 18
Issue 3: Due by July 17, Published week of Aug 10
Issue 4: Due by Oct 30, Published week of Nov 16

SUBMISSION CATEGORIES

- **Organizational Updates:** News from SOFT, Annual Meeting details, Committee Updates, Award Announcements, Continuing Education Opportunities, and other information valuable to members.
- **Scientific Submissions:** Research articles, case reports, and scientific studies related to forensic toxicology. Submissions must include an abstract Published abstracts will feature direct links to the full articles.

SUBMISSION PROCESS

- Submit an Article for ToxTalk
- Review and Acceptance: All submissions undergo editorial review. The editorial team reserves the right to edit for clarity, grammar, and style. Acceptance notifications will be communicated promptly.

FUTURE MEETINGS

SOFT/TIAFT 2026
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Chicago, IL
September 19-24, 2026
Hosts: Luke Rodda & Andre Sukta

SOFT 2027
Rhode Island Convention Center
Providence, RI
September 26-October 1, 2027
Hosts: Sabra Jones & Dani Mata

SOFT 2028
Baird Center
Milwaukee, WI
October 15-20, 2028
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