PharmaED RESOURCES, Inc.

Extractables & Leachables Summit 2022

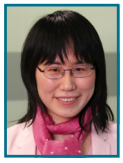
Ensuring Quality, Safety, Suitability and Regulatory Compliance for Drugs, Biologics and Medical Devices

September 20–21, 2022, Philadelphia PA

Featuring Lessons Learned and Case Studies from Industry Experts:

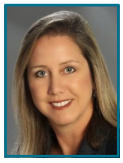
Christopher Houston
Bausch + Lomb

Ping Wang
Johnson & Johnson



Dujuan Lu
SGS

Dennis Jenke
Triad Scientific



Sherry Parker
WuXi AppTec

Ron Brown
FDA (retired)

Diane Paskiet
West

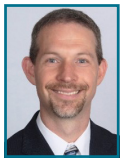
Praneeth Edirisinghe
Pfizer

Ted Heise
MED Institute

Prabhakar Reddy
USP

Mike Ruberto
Material Needs

Mike Eakins
Eakins & Assoc.



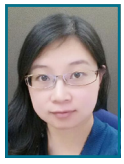
Mark Jordi
Jordi Labs

Piet Christiaens
Nelson Labs

Eric Hill
Boston Analytical

Steve Zdravkovic
Baxter

Atish Sen
AstraZeneca



Cherry Shih
Pall

Gyuri Vas
Intertek

Sam Albeke
VR Analytical

With Comprehensive Coverage On:

- Designing and Improving Risk-Based Assessment of E&L Data for Drugs, Biologics, and Medical Devices
- Novel Approach to Justify Model Solvents and New Screening Tools for Extractables
- ISO 10993-17: Application of Proposed New Approaches to Facilitate Toxicological Risk Assessment of Medical Devices
- Medical Device E&L: The ISO 10993-12 Extraction Conditions Round Robin Study and Its Aftermath
- PQRI Safety Thresholds: Putting in Place E&L Best Practices for Parenteral Drug Products
- Analytical Considerations in Extractables and Leachables Testing of Drug-Device Combination Products
- AETs and Response Factor Variation for E/L Studies
- Impact of Sterilization Methods to Extractable Profiles of Single Use Systems
- Overcoming Common Analytical Challenges in E&L Studies
- Toxicology Assessment for E&L Studies
- Extractables and Leachables Assessments for Lower Risk Dosage Forms
- Chemical Characterization in Biocompatibility for Med Devices
- Extractables & Leachables Case Study for Cream/Gel Drug Topical Drug Product
- E&L Considerations in the Qualification and Validation of Single-Use Systems
- Addressing E&Ls from Bioprocessing Equipment & Product Packaging Perspectives
- And More!

With Representation From:

Baxter · WuXi AppTec · Johnson & Johnson · Pfizer · B+L Bausch + Lomb · AstraZeneca · West · MED Institute · USP

VR Analytical · Nelson Labs · Jordi Labs · Boston Analytical · SGS · intertek · PALL · Material Needs Consulting · TRIAD · eurofins | EAG Laboratories

Contact: Kim Hubbard
khubbard@pharmaedresources.com or call (217) 721-5774

Pharma Ed's Extractables & Leachables Summit 2022 is Sponsored by

Gold Sponsor

eurofins | EAG Laboratories

Event Sponsors

DATWYLER

ASPEN RESEARCH

element

Boston ANALYTICAL

Jordi Labs
MATERIAL SOLUTIONS. UNCOMPROMISING INTEGRITY.

EKG Labs
Heartbeat of Analytical Services

Nelson Labs
A Sotera Health company

VR ANALYTICAL
Excellence in extractables & leachables testing

intertek
Total Quality. Assured.

cerno BIOSCIENCE

SMITHERS
INNOVATE WITH CONFIDENCE

ENergon Labs
An extension to your own laboratory

Material Needs CONSULTING
Medical Device and Packaging Services

Neopharm LABS

TRIAD Scientific Solutions

Trinity Consultants | SafeBridge® Regulatory & Life Sciences Group

10 ON drugDELIVERY
CELEBRATING 10 YEARS

Tuesday, September 20, 2022

7:00 *Check in & Complimentary Breakfast*

7:55

Chairperson Michael Eakins' Welcome & Opening Remarks

8:00 **The Future of E&L Assessment**

Atish Sen, Staff Scientist, AstraZeneca

The landscape for E&L assessment has changed over the past two decades. We now have a better understanding of E&L and improved procedures for analyses. Currently updates to regulations and standards are ongoing that will influence E&L assessment in the future. The adoption of ICH Q3E will harmonize the various recommendations, sometimes at odds, that exist currently. Re-defining basic terms such as SCT, AET, UF, etc. will be implemented. Concepts such as migration modelling will be more common. All these changes that will affect E&L will be discussed.

Spotlight on Solvent Selection

8:40 **Novel Approach to Justify Model Solvents and New Screening Tools for Extractables**

Praneeth D. Edirisinghe, Principal Scientist, Pfizer (co-authors: Vishal Barge, Matthew Reichert)

The purpose of an extractables study is to identify potential leachables from a pharmaceutical packaging system. The extractables profile of a packaging system depends on the materials used to construct the packaging system and on the chemical and physical properties of the drug product formulation. This presentation introduces the concept of using the dielectric constant to identify an organic solvent system relevant to the drug product formulation. The use of a dielectrically equivalent simple model solvent system to the drug product of interest should generate an extractables profile that is relevant to the drug product formulation. The advantages of this method versus that of the more traditional approach, where exposing the packaging system or its materials of construction to organic extraction solvents designed to generate a worst-case extractables profile, will be discussed. Traditional approaches to generating extractable profiles do not always generate a profile that is relevant to the drug product formulation. This can create a significant burden to not only identify potentially irrelevant extractable compounds, but also significantly increases the scope of toxicological assessments. Furthermore, the exaggerated extractables profile may lead to inappropriate targets being identified for leachables analysis potentially leading to some unexpected impurities in the drug product. The results of a proof-of-concept study performed to demonstrate the relationship between the dielectric constant and the concentration of compounds extracted using various organic solvents will be presented.

9:20 **Case Study—Needles in a Pharmaceutical Haystack**

Christopher Houston, Senior Principal Scientist & Group Leader, Bausch + Lomb

CASE STUDY

Following the development of an ophthalmic solution, stability studies revealed unusual subvisible particulate matter with a needle-like crystal habit forming over time. The usual sources of undesirable subvisible particulate matter were quickly eliminated as root causes, leading to an extensive global investigation that ultimately resolved into a highly unusual example of a drug product leachable. As a case study, this presentation will focus on the investigation, its resolution, and lessons learned.

10:00 *Morning Coffee & Networking Break*

10:30 **Impact of Sterilization Methods to Extractable Profiles of Single Use Systems**

Ping Wang, Director, Johnson & Johnson

The rapid development of biological drug products, such as monoclonal antibodies, vaccines, and cell & gene therapy (CGT) products created great demand for single-use technologies (SUT) in the biomanufacturing process. The sterility of those SUT materials is critically important to product quality and patient safety. The commonly used methods to sterilize the SUT materials include e-beam, gamma irradiation, autoclave, ethylene oxide, and X-ray. Due to the nature of various technologies, the impact to extractable profiles of SUT materials is of concern to drug manufacturers and health authorities. This presentation will compare the extractable profiles of various materials sterilized with different methods (especially autoclave and gamma irradiation). The results could be used to perform risk-based assessment, and evaluate the suitability of extractable data generated with different sterilization methods.

Spotlight on E&L for Container Closure Systems & Components for Lyophilized Drug Products

11:10 **The Necessity of Extractable & Leachable Qualifications for Lyophilized Drug Products: Some Misconceptions Addressed**

Dr. Piet Christiaens, Scientific Director, Nelson Labs Europe

When selecting and qualifying the Primary Packaging for lyophilized drug products, one of the obvious questions is, how deep should one go into the E/L-qualification process of a lyo-container? As the drug product is in a solid state, it is expected that the interaction between the lyophilized drug product and the components of a lyo-container will be low. This is also reflected in the USP<1664> Monograph on Leachables and the EMA Guideline on "Plastic Immediate Packaging Materials" (2005). However, the mechanism of interaction between the lyo-cake and e.g., the rubber stopper (when considering a lyo vial) are not always fully understood. The interaction mechanism is

based upon "outgassing" of the rubber stopper, where the lyo cake acts as an adsorbent. Not only can this lead to substantial accumulation of the volatile and semi-volatile leachable compounds onto the lyophilized drug product, it may also induce chemical reactions between the leachables and the drug product, i.e., when the adsorbed leachables show electrophilic properties.

11:50 *Complimentary Lunch*

1:00 **Post-lunch presentation, sponsored by**

eurofins | EAG Laboratories

Abstract Coming Soon.

1:20 **Comparison of the Levels of Rubber Stopper-Related Organic Leachables in Commercially Available Vialed Liquid and Lyophilized Drug Products**

Steve Zdravkovic, Research Scientist II, Baxter International

Rubber stoppers that seal the primary packaging systems of parenteral pharmaceutical products have the potential to introduce impurities into the drug during storage. While this interaction has been well characterized for products stored as an aqueous liquid, it is not well understood how the interaction is affected when the product is stored as a lyophilized solid. Accordingly, the goal of the study described in this presentation was to determine how lyophilization affects the propensity for impurity migration (leaching) into the product. This was achieved by measuring the concentration of substances in the stopper and the concentration of these substances that had leached into the product at equilibrium for twelve lyophilized and twelve liquid commercial drug products. These concentrations were then used to calculate equilibrium constants, which quantified the degree of partitioning of each compound between each unique stopper and drug matrix, and compare the leaching behavior of each liquid and lyophilized drug product included in this study.

Critical Issues—Response Factor Variation in AETs

2:00 **Mitigating Response Factor Variation in Application of the Analytical Evaluation Threshold, Large UF or Multiple Detectors**

Dr. Mark Jordi, President, Jordi Labs

The characterization of extractables and leachables (E&L) is an integral part of ensuring biocompatibility for many medical devices and pharmaceutical products. Guidance for E&L has been provided in USP <1663> and <1664> for pharmaceutical products and in ISO 10993-18 for medical devices. The first step in the E&L process involves detection of those compounds which are suspected to be at or above the level of toxicological concern. This process is accomplished through the use of the Analytical Evaluation Threshold (AET) which links the toxicologically relevant concentration to the observed analytical signals. A significant problem in AET evaluation is caused by response factor (RF) variation. It is an unfortunate reality that compounds which are at equivalent concentration do not always or even often give equivalent signal response on various detector systems including mass spectrometers. Recent publications have highlighted these risks for both LCMS (Jordi, et al. J. Pharm. Biomed. Anal. 2018, 150, 368–376) and GCMS (Jenke and Odufu, Journal of Chromatographic Science 2012;50:206–212). The prominent and necessary use of surrogate standards for AET evaluation introduces error into the precise estimation of the signal strength which corresponds to the toxicologically relevant concentration. To overcome this problem, an uncertainty factor has been introduced into the AET equation and regulatory agencies have provided recommendations as to values for the UF (GC/MS with UF =4, LC/MS with UF =10). While this approach does account for response variation, it also introduces other difficulties including lower AET values which can be difficult or impractical to achieve which then require additional sample concentration due to limited instrument sensitivity. This has the potential to counteract the perceived benefit resulting in compound loss or degradation and additional regulatory scrutiny of the sample preparation process. This approach also results in a significant potential for false positives (I.e., compounds that are below the AET concentration are determined to have a peak area above the threshold associated with the AET). An alternative approach is therefore desirable.

In this talk, the use of large UFs for GCMS and LCMS (UF = 4 and 10 respectively) will be contrasted with the use of a multidetector approach to AET evaluation. The multidetector approach leverages the independence of the response factors for a given compound obtained on different detectors and chromatographic systems to overcome potential weak signals on any one detector and thus reduces the reliance of the method on UF to overcome response variation. The multidetector approach was summarized in two recent publications (Jordi, et al. J. Pharm. Biomed. Anal. 2020, 186, 1-14 and Jordi, et al. PDA Journal, vol. 75, No. 2 2021, pg. 289-301). The effectiveness of using a combination of triple detection Liquid Chromatography Mass Spectrometry (LCMS) with Ultraviolet (UV) and Charged aerosol detection (CAD) as well as Gas Chromatography Mass Spectrometry (GCMS) will be presented. A real world medical device analysis will be used to provide a comparison of the concentration factors and numbers of devices required to complete a study using the two approaches. Quantitation for reference compounds characteristic of the polymer systems will be used to gauge the potential for false positives. Finally, the benefits of this approach for detection of compounds with little to no mass spectrometry response will be highlighted including demonstration of false negatives using the UF of 4 and 10 strategy.

2:40 *Afternoon Networking & Coffee Break*

3:10 **Back to Basics: The Importance of Proper System Suitability and Limit of Detection for E&L Studies**

Gyuri Vas, Business Technical Scientific Liaison, Intertek Pharmaceutical Services

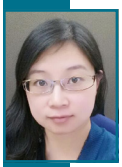
Since the AET concept was introduced to the analytical testing of extractables and leachables, the analytical test methods required to have detection capability below to that limit. It was not a challenging task when the AET levels were at or above 100 ppb level, which can be achieved by any laboratory. When the industry moved to lower detection requirements related to large volume parenteral products, however, laboratories faced more challenges. For the E&L data packages, US FDA requires evidence for the performance of the analytical methods used for the testing, and one of the most critical performance parameters is the limit of detection (or LOQ). The ICH method validation guidance (Q2B (R1)), providing guidance for calculating the limit of detection, however, does not provide examples in detail how to execute those calculations. The most common method for LOD assessment is determined by a signal-to-noise calculation, however this approach has significant flaws. Examples related to E&L studies with different AET levels, will be presented to show how an LOD of an analytical method can be appropriately assessed.

3:50 **PQRI Safety Thresholds: Putting in Place E&L Best Practices for Parenteral Drug Products**

Diane Paskiet, Director, Scientific Affairs, West Pharmaceutical Services

As drug and biological products and their delivery systems become more and more complex, so does the challenge of assessing risks associated with extractables and leachables. The overall concepts for safety thresholds are part of the benefit-risk framework, but the justifications and documentation for the analytical evaluation threshold, extraction conditions, extraction solvents and analysis are critical to ensure the proper data for intended use. This presentation will highlight the current day regulatory environment and various scenarios for developing E&L studies and assessing patient safety.

4:30 **Qualification and Risk Assessment of a Single Use System**



Chien-Ju (Cherry) Shih, Ph.D. Senior Scientist, Regulatory and Validation Strategy, Pall Corporation

CASE STUDY

The increasing availability of extractable datasets aligned to standardized protocols (BPOG and USP <665> -low, moderate, high risk) have made it possible to risk assess a complex single-use system (SUS) which consist of multiple components and various materials of construction. A streamlined approach for utilizing existing datasets to support end user qualification of SUSs will be shared, as well as how the aggregate component approach (on paper exercise) compares to a process-specific, simulation solvent approach preformed on the final customized assembly. The benefits, challenges and takeaways from this comparison will be discussed. In addition, modifications and similar approaches that leverage existing knowledge and datasets to risk assess potential future changes to system (e.g., addition of sensor, tubing length, etc.) will be explored.

5:10 ***Happy Hour Mixer***

Join your colleagues in the hotel bar for informal networking. Complimentary appetizers provided.

Wednesday, September 21, 2022

Regulatory Spotlight: Implementing ISO 10993 Standards for Med Devices

8:15 **Medical Device E&L: The ISO 10993-12 Extraction Conditions Round Robin Study and Its Aftermath**

Ted Heise, Vice President, Regualtory & Clinical Services, MED Institute

In 2015, results of a study on ISO 10993–12 extraction conditions raised questions in ISO/TC 194 about adequacy of the conditions for genotoxicity hazard identification. The results spurred formation of a task force that designed and oversaw a round robin study intended to investigate 10993–12 extraction conditions in greater depth. In the study, four laboratories each extracted four materials with a variety of solvents using several different extraction ratios, temperatures, and durations. The resulting extracts were analyzed using instrumental methods widely employed in the E&L field. Unforeseen challenges caused the study to report out only a portion of the planned results; most profoundly, reporting number rather than area of peaks from each analysis. Analysis of these limited data showed no significant trends for any extraction condition; however, solvent polarity was significant.

The limited study data did suggest a notable degree of variation between laboratories. In depth evaluation of the methods used across the labs found a number of differences that likely contributed. Identification and quantitation of key peaks were subsequently carried out for GCMS and LCMS of one extract; some common findings were observed in the GCMS results. The principal conclusion was that the study was poorly suited to either exonerate or indict the adequacy of chemical characterization as practiced by the participating laboratories.

Despite study limitations, its results provoked considerable concern and several disparate related activities. These included:

- Formation of a new task force in the TC charged with developing a technical report aimed to provide guidance on optimizing quality of extractables studies
- A deluge of onerous deficiency questions from regulators reviewing E&L studies of medical devices
- Consideration of a potential new round robin study within broader discussions hosted by FDA's Office of Science and Engineering Laboratories

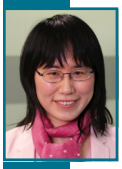
This session will deliver a high-level overview of the TC 194 round robin study and provide attendees with updates on these listed activities.

8:55 **ISO 10993-17: Application of Proposed New Approaches to Facilitate Toxicological Risk Assessment of Medical Devices**

Sherry Parker, Senior Director of Regulatory Toxicology, WuXi AppTec

Based on the recently published requirements and recommendations of ISO 10993-18:2020: chemical characterization of medical devices often results in very large numbers of chemicals generated through exaggerated and exhaustive extractions, and the burden of conducting toxicological risk assessments of these large sets of screening data. ISO 10993-17 is currently under revision, soon to be published, and will provide guidance for exposure dose estimation, use of toxicological thresholds, and derivation and evaluation of Margins of Safety for medical device constituents. The proposed revision of ISO 10993-17 also has tools that will reduce the burden of toxicological risk assessment, including the application of toxicological screening limit to prioritize chemicals for toxicological risk assessment, and estimation of exposure to extractable chemicals through assumed or actual release kinetics information for extractable chemicals. This new standard will also serve to identify short-term vs. long term toxicological risks, and this will lead to more practical risk mitigation strategies. An overview of the new revision will be presented, and examples using medical device extractables data will be provided to demonstrate these new approaches.

9:35 **Analytical Considerations in Extractables and Leachables Testing of Drug-Device Combination Products**



Dujuan Lu, PhD, Manager/Global Leader-E&L, SGS Health Sciences

Combination products are therapeutic and diagnostic products that combine drugs, devices, and/or biological products. Depending on whether the product is intended to submit as a medical device, pharmaceutical drug product, or biological drug product, the requirements in terms of extractable and leachable (E&L) testing could be different. The E&L study designs of pharmaceutical and biological drug products typically follow USP <1663> and <1664> for extractables and leachables associated with pharmaceutical packaging/delivery system. However, E&L testing for medical devices is usually considered as chemical characterization of medical device materials per ISO 10993-18.

This presentation will overview the difference and similarity of E&L requirements between pharmaceutical products and medical devices. The key elements regarding E&L study design of combination products will be discussed. Several case studies on the extractables and leachables testing of combination products will be presented.

Key points to be covered:

- Regulatory & industry guidance to follow for E&L study design of Drug-Device Combination Products
- Difference & Similarity on E&L requirements between pharmaceutical products and medical devices
- Case studies on E&L Testing of combination products

10:15 ***Morning Networking & Coffee Break***

Mitigating Uncertainty in Chemistry Characterization & Toxicological Risk Assessment

10:45 **Leachables to Extractables Correlation: Noose, Nuisance, Nonsense or Necessity?**

Dennis Jenke, Founder & Principal, Triad Scientific Solutions

It all started with a simple concept. If a packaging system is profiled for extractables, presumably as a means of forecasting leachables, and then the packaged drug product is profiled for leachables over shelf-life, logically there will be a strong correlation between the list and amounts of leachables and the list and amounts of extractables. Such a correlation is fortuitous as it serves three useful purposes: (1) verifies the rigor and completeness of the leachables profiling activity (as one does not want to miss leachables during a leachables migration study), (2) allows extractables testing to do the work of leachables testing in activities such as change control (as managing change by testing incoming items for extractables may be simpler and more efficient than testing manufactured drug products for leachables), and (3) supports the premise that extractables data can forecast leachables. But then things got complicated. Extractables and leachables studies were performed and poor correlations were obtained, suggesting (perhaps) that the honorable profession of E&L testing was not being practiced with the expected and necessary high level of scientific competence. In fact, nothing could be further from the truth. In this presentation we are reminded of the underlying aspects of study design and implementation that must be recognized and controlled to enable the effective correlation of leachables to extractables and we remember the logical, and perhaps not so logical, reasons why even under the most equitable and well-controlled experimental circumstances leachables may not be correlatable to extractables.

11:25 **Practical Use of Computational Models for the Chemical Characterization and Toxicological Risk Assessment of E&L Compounds Released from Medical Devices**

Ron Brown, Risk Science Consortium, LLC

Accurate chemical characterization information and toxicity data are needed to assess the toxicological risks posed by patient exposure to compounds released from medical device materials. However, compound-specific exposure and toxicity data are sometimes

lacking for E&L compounds and this lack of data introduces uncertainty into the toxicological risk assessment process. In the absence of the necessary data, computational models can often be used to support the chemical characterization process and to predict the toxicity of the extracted compounds. For example, the nontargeted analysis approach typically used for the chemical characterization of medical devices often results in the presence of unidentified compounds in the extract. The EPA CompTox Chemicals Dashboard will be discussed as a tool to help identify unknowns resulting from nontargeted analysis. There are also challenges associated with estimating the rate at which compounds are released from an implanted device under clinically relevant extraction conditions. Migration models, like the FDA Color Hazard and Risk (CHRIS) Calculator, will be discussed as a means to estimate the rate at which leachable compounds, notably, color additives, migrate from implanted devices. To address the lack of compound-specific toxicity data, computational models can be used to fill these gaps for data-poor compounds. Open-source models to predict the potential mutagenicity and carcinogenicity of extracted compounds will be discussed and models to predict other toxicological endpoints, like skin sensitization, will be explored. Finally, the importance of evaluating the accuracy of model-derived predictions using an expert review process is discussed and emphasized.

12:05 *Complimentary Lunch*

1:15 **Extractables and Leachables Assessments for Lower Risk Dosage Forms**

Michael A. Ruberto, President, Material Needs Consulting

Most of the newly published "best practices" for extractables and leachables (E&L) testing for container closure systems are focused on high-risk dosage forms, such as inhalation, injectable, and ophthalmic drug products. But what are the regulatory expectations for lower risk dosage forms such as oral and topical? Can a "risk-based approach" be used to in designing the E&L testing strategy for these drug products? This presentation will focus on proactive approaches for determining the leachables risk for primary and secondary packaging used with solid and liquid oral dosage forms as well as topical drug products. Some of the discussion topics will include:

- Leveraging the selection of materials of construction for the container closure systems that are regulated for food contact applications according to 21 CFR 174-186 in the design of the extractables testing
- Examples of performing assessments in the form of "paper exercises" versus E&L testing
- Effectively assessing the leachables risk of bottles constructed from various types of polymers
- The impact of closures and corresponding liners and/or induction seals on leachables
- How to efficiently determine the leachables risk of adhesive labels
- E&L study plans for plastic and metal tubes used to package topical drug products
- How to efficiently address post-approval changes to the materials of construction for container closure systems

1:55 **Extractables & Leachables Case Study for Cream/Gel Drug Topical Drug Product**

Eric Hill, Senior Director of Chemistry Laboratories, Boston Analytical

Topical creams and gels are used to treat dermal conditions, and also incorporate the active ingredient of the drug transdermally into the circulatory system through the skin. Topical products have many applications; however, they present unique leachables concerns compared to traditional drug products. Topical creams and gels typically take the form of an oil-in-water emulsion, which is a very complex matrix to analyze. Extractables studies involve extraction of the packaging components (usually comprised of tubes or pumps) with neat solvents, which must be selected to incorporate the chemistry of the oil-in-water emulsion matrix. Leachables studies must incorporate analysis of the cream or gel material directly for leachables. The complex formulation of the emulsion results in interferences observed during the chromatographic analyses, if prepared using standard liquid-liquid extraction or dilution techniques. Topical products also often have low AET values, due to the high dosage amounts which complicates the challenge of working with this product type. A work flow is presented that gives detailed procedure involving concentration and clean-up to simultaneously achieve the low AET value and remove matrix interference. The resulting samples are analyzed as appropriate for volatiles, semi-volatiles, non-volatiles, and metals with gas chromatography/mass spectrometry (GC-MS), liquid chromatography/mass spectrometry (LC-MS) and inductively coupled plasma mass spectrometry (ICP-MS) to provide comprehensive leachables profiles. Data and the study outline will be presented.

2:35 *Afternoon Break*

2:50 **Sample Enrichment Approaches for Extractable and Leachable Studies**

Sam Albeke, LC Manager, VR Analytical

Extractable and leachable studies are designed with the patient in mind. Therefore, analytical evaluation thresholds (AET) based on thresholds of toxicological concern (TTC as per ICH M7) are calculated in order to determine the minimum analyte concentration required by the analysis. Required limits of quantification are often low ppm to ppb levels but can often be lower. This is close to limit of detector sensitivity. Sample preparation and sample enrichment are critical in achieving the required sensitivity for successful extractable and leachable studies. These approaches are amongst the least considered and understood areas of extractable and leachable program design. We will present different

sample preparation approaches for improving analytical sensitivity for non-targeted trace analysis via a range of novel and well-established automated sample introduction techniques. These approaches are particularly important for samples which require detection thresholds which are below the detectors limit of detection/quantification, while overcoming challenges of complex matrices. The following topics will be discussed:

- Key analytical challenges associated with meeting ever decreasing AET's to assess patient safety
- Overview of novel and well-established sample enrichment approaches
- Case studies highlighting analytical advantages for analytes across the physico-chemical space

3:30 **USP's Perspective on the Development of System Suitability Standards for the Analysis of Extractables and Leachables**

Dr. Prabhakar Reddy, Senior Principal Scientist, Team Leader Science, General Chapters, United States Pharmacopeia

Abstract to come.

Critical Issues Roundtable

3:45 **Should E&L Reference Standards be Standardized?—A Roundtable Discussion**

Moderator: Michael Eakins, Eakins & Assoc.

Panelists:

- Christopher Houston, Bausch + Lomb
- Dennis Jenke, Triad Scientific Solutions
- Piet Christiaens, Nelson Labs Europe
- Prabhakar Reddy, USP

Participants:

The Audience

4:25 ***Close of Program***

PharmaED RESOURCES, Inc.

PharmaEd Resources, Inc. • 2810 Robeson Park Drive • Champaign, IL 61822

About your conference destination:

Located in Philadelphia (Center City), Wyndham Philadelphia Historic District is within a 10-minute walk of Liberty Bell Center and Independence Hall. This eco-friendly hotel is 0.9 mi (1.4 km) from Pennsylvania Convention Center and 1 mi (1.5 km) from Reading Terminal Market. Enjoy recreational amenities such as an outdoor pool and a 24-hour fitness center. Additional features at this hotel include complimentary wireless Internet access, concierge services, and gift shops/newsstands. Featured amenities include a business center, complimentary newspapers in the lobby, and dry cleaning/laundry services. Self-parking (subject to charges) is available onsite. Enjoy American cuisine at Coins Restaurant and Pub, a restaurant which features a bar/lounge, or stay in and take advantage of the room service (during limited hours).

Registration Information

Register for the conference using one of three options:
Online: www.pharmaedresources.com **Phone:** (217) 721-5774
Mail: 2810 Robeson Park Drive, Champaign, IL 61822

Please Complete the Following

FIRST NAME: _____

LAST NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

ADDRESS: _____

CITY: _____ **STATE:** _____

ZIP: _____ **COUNTRY CODE:** _____

OFFICE PHONE: _____

MOBILE PHONE: _____

FAX: _____

E-MAIL: _____

VENUE INFORMATION:

Dates:	September 20–21, 2022
Venue:	Wyndham Philadelphia Historic District
Venue Address:	400 Arch Street Philadelphia, PA 19106
Venue Phone:	215-923-8660

Please register me for:

Extractables & Leachables Summit 2022

Standard Registration	**$1,695**
Early Bird Registration (by July 15)	**$1,495**
Call for government, academic, or non-profit rate	

PAYMENT METHOD

CREDIT CARD REGISTRATION:

☐ CREDIT CARD ☐ VISA ☐ MASTERCARD ☐ AMEX

NAME: _____

CARD #: _____

EXPIRATION: ____ / ____

SIGNATURE: _____

BILLING ADDRESS: _____

CHECK REGISTRATION:

To pay by check, please provide a purchase order below. Please note that all payments must be received five (5) days prior to the conference to ensure space. Attendees will not be admitted to the conference without full payment.

PURCHASE ORDER #:

PLEASE NOTE:

PharmaEd Resources does not offer refunds. However, if you cannot attend after registering, we are happy to apply your registration fee to another PharmaEd Resources event, or transfer your registration to a colleague. Notice of cancellation must be received at least 5 days prior to the event.