PROGRAM

40TH STP ANNUAL SYMPOSIUM

Toxicologic Pathology Relevant to Pediatric Populations

Virtual | June 28–June 30, 2021

SOCIETY OF TOXICOLOGIC PATHOLOGY

Improving Human, Animal & Environmental Health

ANNUAL SYMPOSIUM OVERVIEW

Pre-Symposium Events

Wednesday, June 23

10:00 AM–10:30 AM EDT
Annual Business Meeting

11:00 AM–2:15 PM EDT
Career Development Workshop: Money Talks: The Toxicologic Pathologist's Guide to Career Management and Financial Planning

Thursday, June 24

10:00 AM–11:00 AM EDT
Awards and Recognition Ceremony

11:30 AM–12:30 PM EDT
Career Development Roundtable: Working Remotely: Benefits and Challenges

Friday, June 25

10:00 AM–1:35 PM EDT
NTP Satellite Symposium: Pathology Potpourri

Symposium Events

Monday, June 28

10:00 AM–11:00 AM EDT
Symposium Introduction and Keynote: Bridging Scientific Gaps in Pediatric Therapeutic Development

11:00 AM–1:15 PM EDT
Session 1: Critical Postnatal Development of the Juvenile Rat

11:30 AM–11:45 AM
Break

1:45 PM–5:00 PM EDT
Session 2: Systems Development with ADME and Clinical Pathology Considerations in Juvenile Animals

3:15 PM–3:30 PM EDT
Break

Tuesday, June 29

10:00 AM–1:15 PM EDT
Session 3: Regulatory Perspectives on Juvenile Animal Toxicologic Pathology

11:15 AM–11:30 AM EDT
Break

1:45 PM–5:00 PM EDT
Session 4: Practical Interpretations in Juvenile Toxicologic Pathology

3:15 PM–3:30 PM EDT
Break

Wednesday, June 30

10:00 AM–1:15 PM EDT
Session 5: Clinical and Environmental Relevance of Juvenile Toxicology Studies

11:30 AM–11:45 AM EDT
Break

1:45 PM–5:00 PM EDT
Session 6: Unique Endpoints and Challenges in Juvenile Toxicologic Pathology

3:15 PM–3:30 PM EDT
Break

Post-Symposium Events

Thursday, July 1

2:00 PM–3:00 PM EDT
All Voices Welcome: An Introduction to the Diversity, Inclusion, and Belonging Task Force

4:00 PM–5:00 PM EDT
Town Hall: Moving Toward a New and Improved Annual Symposium

Friday, July 23

12:00 PM–3:45 PM EDT
CE1: Moving a Drug into the Clinic: Using PK/PD Modeling to Assess Benefit/Risk and Guide Dosing in Early Trials
(sponsored by the American College of Toxicology)

Friday, August 27

12:00 PM–3:45 PM EDT
CE2: Stem Cell-Derived Therapy Nonclinical Safety Assessment

Friday, September 24

12:00 PM–3:45 PM EDT
CE3: Applications of Artificial Intelligence and Machine Learning in Toxicologic Pathology

COMMITTEES

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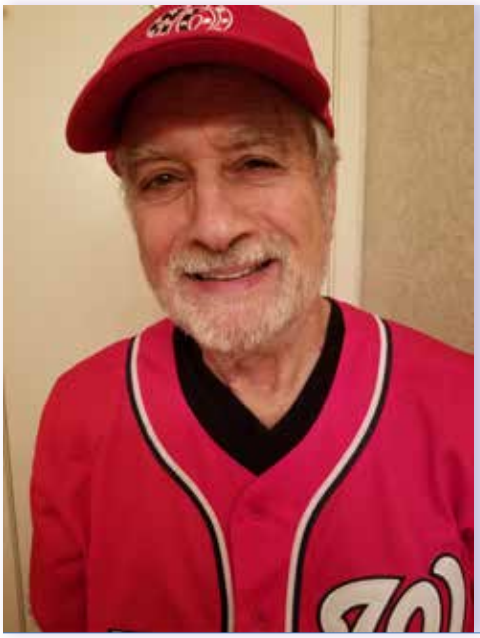
ACCESS VIRTUAL PLATFORM

Access to meeting materials, including speaker and poster abstracts, the attendee list, and links to meeting-related events and surveys, attendees are encouraged to visit the STP 2021 Virtual Platform.

AWARDS



2021 STP LIFETIME ACHIEVEMENT AWARD

Jerry Ward, DVM, PhD, DACVP, FIATP

The Society of Toxicologic Pathology is pleased to recognize Dr. Jerry Ward as recipient of the 2021 STP Lifetime Achievement Award. Dr. Ward is currently a consultant in Veterinary Pathology after retiring from the National Cancer Institute. He is also a Special Volunteer in the Laboratory of Metabolism, NCI, NIH; Adjunct Professor at Cornell University College of Veterinary Medicine, and on the Adjunct Faculty at The Jackson Laboratory. Dr. Ward received his DVM from Cornell University and PhD in Comparative Pathology from The University of California at Davis. He is a Diplomate and Distinguished Member of the American College of Veterinary Pathologists (ACVP).

Dr. Ward has spent much of his career in veterinary pathology employed by the US federal government. He was at the National Cancer Institute in several programs in toxicology (cancer drug development), chemical carcinogenesis and laboratory animal pathology. Dr. Ward was in the original NCI Carcinogenesis Bioassay Program in the 1970s testing environmental chemicals that led, in part, to the present National Toxicology Program (NTP) and was head of Tumor Pathology for NTP in its early years. For the past 20 years much of his work has involved veterinary pathology support of toxicology, cancer, immunology and infectious disease research, often with genetically engineered mice. His special interests include pathology of the liver, hematopoietic and immune systems, CNS, and respiratory tract, tumor pathology and immunohistochemistry.

In addition to being editor of "Pathology of Genetically-Engineered Mice" and co-editor of "Pathology of the Aging Mouse," Dr. Ward co-authored the NCI mouse models of Human Cancer Consortium's tumor classifications for the lymphoid and myeloid systems, prostate, gastrointestinal and respiratory systems. He is presently a member of the INHAND international rodent pathology nomenclature committees for the gastrointestinal tract, hematopoietic and lymphoid system and liver. Dr. Ward's many publications have involved the full spectrum of medical research including tumor pathology, phenotyping genetically-engineered mice and the uses of rodents in toxicology, carcinogenesis, immunology, infectious diseases, cancer drug and vaccine development and aging. Dr. Ward served on the STP Executive Committee and is an Associate Editor for *Toxicologic Pathology* and *Veterinary Pathology*. He is also a member of the Scientific Advisory Board for The Center for Genomic Pathology. He was a member of the Institute of Medicine and National Research Council's Committee on the Framework for Evaluating the Safety of Dietary Supplements. Dr. Ward was awarded the FDA Commissioner's Special Citation for his work on an interagency committee on Nitrite Research and an NIH Director's Award for leading a research effort to discover a new high impact *Helicobacter sp.* in mice.

For his significant record of scientific discovery and achievement throughout his research career, the STP proudly recognizes Jerry Ward as the recipient of the 2021 STP Lifetime Achievement Award.

2021 STP DISTINGUISHED EARLY CAREER AWARD

Ramesh C. Kovi, BVSc&AH, MVSc, PhD, DACVP, DABT, FIATP

Ramesh Kovi has been named the 2021 STP Distinguished Early Career Award recipient. Dr. Kovi is currently working as a Senior Principal Scientist, Pathology at Pfizer Drug Safety Research and Development, Cambridge, MA. Prior to this, he was a Senior Pathologist at Experimental Pathology Laboratories (EPL), and an on-site NTP Pathologist at Division of National Toxicology Program (DNTP), National Institute of Environmental Health Sciences (NIEHS), in Research Triangle Park, North Carolina; Comparative Pathologist and Assistant Professor at the University of Minnesota, Department Veterinary Population Medicine and UMN Masonic Cancer Center. Dr. Kovi received his BVSc & AH from the University of Agricultural Sciences, Bengaluru, India; MVSc in Veterinary Microbiology, Molecular Biology and Biotechnology from CCS Haryana Agricultural University, Hisar, India, and PhD in Cancer Biology from the University of Massachusetts Medical School, Worcester, MA, USA. He is certified in anatomic pathology by the American College of Veterinary Pathologists (ACVP) and in toxicology by the American Board of Toxicology (ABT) and he is a Fellow of the International Academy of Toxicologic Pathology (IATP). In his current role, he focuses on the discovery and regulatory pathology studies in rare diseases, internal medicine, inflammation and immunity, and oncology therapeutic areas. He has distinguished himself by contributing to the understanding of p53-independent tumor suppressor functions of p14ARF in human colorectal carcinoma and deciphering molecular mechanisms of chemical-induced carcinogenesis by applying novel molecular pathology approaches for profiling genetic and epigenetic alterations in rodent tumors. His areas of interest and expertise include neuropathology, molecular/investigative pathology, endocrine pathology, and digital pathology.

Ramesh has over 20 years of experience in cancer biology, molecular biology, and pathobiological sciences and nearly 10 years of experience in veterinary anatomic pathology including toxicologic pathology and molecular pathology. Ramesh is author or co-author of more than 35 peer-reviewed scientific publications, reviews, and book chapters. He serves as an editorial board member of Toxicologic Pathology and reviewer for several journals in the field of cancer biology and pathology. Ramesh is an active member of the American College of Veterinary Pathologists (ACVP), Society of Toxicologic Pathologists (STP), American Board of Toxicology (ABT), Genetics and Environmental Mutagenesis Society-North Carolina (GEMS-NC), American Association of Veterinary Laboratory Diagnosticians (AAVLD), and American Association for Cancer Research (AACR). He has contributed to numerous STP committees, working groups, and panels: Annual Symposium Committee, Awards Committee, Education Committee, INHAND-CNS, and INHAND-Dog working groups and ACVP committees including Education Committee.

For all that he has accomplished in his early career and for his dedicated service to the Society, STP is proud to honor Ramesh Kovi as the 2021 Distinguished Early Career Awardee.

2021 STP OUTSTANDING MENTOR AWARD

Brad Bolon, DVM, MS, PhD, DACVP, DABT, ATS, FIATP, FRCPath

The Society of Toxicologic Pathology is pleased to name Dr. Brad Bolon as the recipient of the 2021 STP Outstanding Mentor Award. Brad earned BS (1983), DVM (1986), and MS (1986) degrees in six years at the University of Missouri, "enjoyed" an anatomic pathology residency (1986–1989) at the University of Florida, and obtained a PhD (1993) from Duke University while completing postdoctoral training at the Chemical Industry Institute of Toxicology (1989–1993). He was employed by Pathology Associates International as associate director of the Molecular and Immunopathology Division (Frederick, MD; 1993–1994) and later as staff pathologist at the National Center for Toxicological Research (Jefferson, AR; 1994–1996) before moving to Wyeth-Ayerst Research (Plainsboro, NJ; 1996–1997) as a senior scientist. Brad served as an experimental pathologist at Amgen (Thousand Oaks, CA; 1997–2004) responsible for evaluating engineered rodents and the efficacy of novel biopharmaceuticals. He subsequently founded an experimental pathology consulting practice (GEMpath, for "Genetically Engineered Mouse Pathology"), working there from 2004 to 2011 in southwestern Utah and later Longmont, CO. Dr. Bolon worked for a time as an associate professor at The Ohio State University College of Veterinary Medicine (Columbus, OH; 2011–2015), after which he returned to Longmont, CO to re-launch GEMpath (2015 to date).

Brad is a Diplomate of the American College of Veterinary Pathologists (DACVP, anatomic pathology; 1991) and American Board of Toxicology (DABT; 1996, re-certified 2001, 2006, 2011, 2016) and is a Fellow of the Academy of Toxicological Sciences (ATS; 2011), International Academy of Toxicologic Pathology (FIATP; 2007), and Royal College of Pathologists (FRCPath; 2019). He has written or co-authored over 250 articles and book chapters, has edited or co-edited five books, and is a frequent speaker at national and international meetings on toxicologic pathology, especially genetically engineered and induced animal models and toxicologic neuropathology. Dr. Bolon has taken leading roles within the STP and the American College of Veterinary Pathologists (ACVP), up to and including seven years on the STP Executive Committee through successful terms as STP Councilor, President-Elect, President, and Past-President, and has had a broad reach into both domestic and global interdisciplinary research and industry environments. He has carried the STP flag in many ways, having had positive impact on recruitment, liaison, educational and outreach efforts identified as important strategic imperatives for the Society. For his exceptional contributions and outstanding mentorship, Brad Bolon is recognized as the 2021 STP Outstanding Mentor.

2021 Daniel Morton and Laura Dill Morton Scholarship

Alexandra Armstrong, DVM, DACVP

Dr. Alexandra Armstrong is a board-certified anatomic pathologist currently completing her PhD at the University of Minnesota. She is advised by Dr. Cathy Carlson (DVM, DACVP, PhD) and her research focus is on animal models of developmental and degenerative orthopedic diseases. With a lifelong love of animals, her passion for comparative medicine and pathology began to grow when she began work as a research associate at a contract research organization (American Preclinical Services, Coon Rapids, MN) after graduating with her BA in Biology from Kenyon College (Gambier, OH). She was a member and class representative of the University of Minnesota College of Veterinary Medicine Class of 2015 and continued on at the University of Minnesota with a residency in anatomic pathology. She is passionate about conducting work at the interface of human and animal health and has developed a particular interest in developmental orthopedic disease, with current research focused on osteochondrosis and Legg-Calvé-Perthes disease. Outside of work, she loves baking, reading and her book club of over 10 years, and time outdoors with her veterinarian husband, 8-month-old son, and their Pudelpointer and German Shorthaired Pointer.

2021 STP Young Investigator Awards

Winners will be announced at the Awards and Recognition Ceremony at 10:00 am on Thursday, June 24.

2021 STP Environmental Toxicologic Pathology SIG Student Research Award

Ishita Choudary, *Louisiana State University, Baton Rouge, LA*

"Postnatal Ozone Exposure Disrupts Alveolar Development, Exaggerates Mucoinflammatory Responses, and Suppresses Bacterial Clearance in Developing Scnn1b-Tg+ Mice Lungs"

2021 STP/ACVP Student Poster Award

Stéphanie Tremblay-Chapdelaine, *University de Montréal, Montréal, Québec, Canada*

"Drone Fertility and Testicular Development: Impact of Exposure to a Miticide and Pesticide"

2021 STP/CTPVSS Student Award

Melissa Wilkinson, *Rutgers University, Piscataway, NJ*

"Alveolar and Interstitial Macrophages Are Activated in a Model of Pulmonary Fibrosis"

Toxicologic Pathology Best Paper Awards

Best Paper Award for Original Manuscript

Atlas of Normal Microanatomy, Procedural and Processing Artifacts, Common Background Findings, and Neurotoxic Lesions in the Peripheral Nervous System of Laboratory Animals

Toxicologic Pathology, vol. 48, 1: pp. 105-131. First published August 19, 2019.

Ingrid Pardo, Klaus Weber, Sarah Kramer, Mark Butt, Alok Sharma, Brad Bolon.

Best Paper Award for Invited Review/Review

Recent Advancements and Applications of Human Immune System in Mice in Preclinical Immuno-Oncology

Toxicologic Pathology, vol. 48, 2: pp. 302–316. First published December 18, 2019.

Michelle Curran, Maelle Mairesse, Alba Matas-Céspedes, Bethany Bareham, Giovanni Pellegrini, Ardiyanto Liaunardy, Edward Powell, Rebeca Sargeant, Emanuela Cuomo, Richard Stebbins, Catherine Betts, Kourosh Saeb-Parsy.

PROGRAM

PRE-SYMPOSIUM EVENTS

WEDNESDAY, JUNE 23

Annual Business Meeting

10:00 AM–10:30 AM EDT

Career Development Workshop

11:00 AM–2:15 PM EDT

Money Talks: The Toxicologic Pathologist's Guide to Career Management and Financial Planning

***Co-Chairs:* Brent Walling, DVM, PhD, DACVP, DABT,** *Charles River Laboratories, Ashland, OH; and* **Ryan Schafbuch, DVM, MS, DACVP,** *Charles River Laboratories, Senneville, Québec, Canada*

Career management is important to the pathologist for both professional and economic success but can easily neglected. Some of this can be attributed to our focus on science and pathology in our day-to-day activities. Additionally, management and finance are not typically part of any pathology training or PhD program. Many of us also ignore student loan debt (shudder!) and only concentrate on paying our monthly bills on time. We can do better for ourselves and pathologists could benefit from a basic understanding of some managerial and financial tools which can be used to build one's career and achieve both professional and personal economic goals. A further understanding of financial goals and how they shift from the start of a career to retirement is also important in order for us to plan accordingly. This session is to provide some guidelines to maximizing your economic success throughout your career.

11:00 AM–11:40 AM EDT	**Management Tools** *Susan Emeigh Hart, VMD, PhD, DACVP, DABT, ERT, VenatoRx Pharmaceuticals, Inc., Malvern, PA*
11:40 AM–12:20 PM EDT	**The Components of a Compensation Package: Beyond the Salary** *Haydee Acebo-Bermello, MBA, SPHR, SPHR-CP, Charles River Laboratories, Reno, NV*
12:20 PM–12:35 PM EDT	Break
12:35 PM–1:15 PM EDT	**Starting and Operating a Pathology Consultation Business** *JoAnn Schuh, DVM, PhD, DACVP, DABT, JCL Schuh, PLLC, Bainbridge Island, WA*
1:15 PM–1:55 PM EDT	**Financial Planning** *Tony Bartels, DVM, MBA, Veterinary Information Network, Davis, CA*
1:55 PM–2:15 PM EDT	**Roundtable Discussion**

THURSDAY, JUNE 24

Awards and Recognition Ceremony

10:00 AM–11:00 AM EDT

Career Development Roundtable

11:30 AM–12:30 PM EDT

Working Remotely: Benefits and Challenges

***Co-Chairs:* Tracey Papenfuss, DVM, PhD, MS, DACVP,** *Charles River Laboratories, Westerville, OH; and* **Jessica Grieves, DVM, PhD, DACVP,** *Ionis Pharmaceuticals, Carlsbad, CA*

Topics of discussion may include: 1) The types of remote position possibilities relative to career stage (e.g., early, mid, late) and types of activities that are amenable to working remotely in various settings (CROs, big pharma, etc.). 2) Some of the pros/cons (benefits/drawbacks) to working remotely. 3) The tools and resources needed to work remotely. 4) Negotiating with your management team/organization to structure the arrangement for success. The goal of the panel discussion will be to familiarize STP members with considerations for working remotely and to provide practical insights for those considering such a role.

FRIDAY, JUNE 25

NTP Satellite Symposium: Pathology Potpourri

10:00 AM–1:35 PM EDT

Chair: Susan A. Elmore, MS, DVM, DABT, FIATP, DACVP, NIEHS/NTP, *Research Triangle Park, NC*

The objective of this interactive symposium is to provide continuing education on interpreting pathology slides, to generate lively and productive conversation, and to have a good time. During each talk, the speakers will project a series of images of lesions on one screen with a choice of diagnoses/answers on a separate screen. The members of the audience will then vote and the results will be displayed on the screen. Time is allowed for discussion after each voting session.

10:00 AM–10:10 AM EDT	**Welcome and Introductory Remarks** *Susan A. Elmore, MS, DVM, DABT, FIATP, DACVP, NIEHS/NTP, Research Triangle Park, NC*
10:10 AM–10:35 AM EDT	**Brains Behaving Badly** *Gregory Krane, DVM, PhD, DACVP, Charles River Laboratories, Shrewsbury, MA*
10:35 AM–11:00 AM EDT	**Oh, My Aching Kidneys** *Jerrold Ward, DVM, PhD, DACVP, Global VetPathology, Montgomery Village, MD*
11:00 AM–11:20 AM EDT	**Don't Get Nervous, It's All Under Control** *Debra A. Tokarz, DVM, PhD, DACVP, Experimental Pathology Laboratories, Inc., Research Triangle Park, NC*
11:20 AM–11:35 AM EDT	Break
11:35 AM–12:05 PM EDT	**Vehicular Conundrum** *Shambhunath Choudhary, BVSc, PhD, DACVP, DABT, Pfizer, Inc., Pearl River, NY*
12:05 PM–12:35 PM EDT	**Fertile Ground, Unexpected Harvest** *Quinci Plumlee, DVM, DACVP, Charles River Laboratories, Reno, NV*
12:35 PM–1:05 PM EDT	**The Grumpy Old Adrenal** *Andrew W. Suttie, BVSc, PhD, DACVP, Covance Laboratories, Inc., Chantilly, VA*
1:05 PM–1:35 PM EDT	**Let's Get Atypical** *Erin M. Quist, DVM, MS, PhD, DACVP, Experimental Pathology Laboratories, Inc., Research Triangle Park, NC*

SYMPOSIUM EVENTS

MONDAY, JUNE 28

Overview of Juvenile Toxicologic Pathology

10:00 AM–10:10 AM EDT

Wendy Halpern, DVM, PhD, DACVP, Genentech, South San Francisco, CA

Keynote Address: Bridging Scientific Gaps in Pediatric Therapeutic Development

10:10 AM–11:00 AM EDT

Susan McCune, MD, US FDA, Silver Spring, MD

Pediatric product development is critical for treatment and prevention of diseases in children. Historically, children have been the lynchpin for legislative changes driving the requirement to determine that therapeutics provided to the American public are safe and efficacious. As products are being developed for diseases in children, innovative approaches provide the underpinning to evaluating safety and efficacy, and all available data need to be leveraged to augment the entire portfolio. Non-clinical data are critical in understanding potential safety issues as well as providing models to understand the mechanism of action of a product. Growth and development of children play a key role in the unique aspects of safety and dose development. Juvenile toxicology models are vital to understanding the safety of therapeutics, and young animal models that reflect human ontogeny provide key information with respect to potential efficacy. For certain diseases that are unique in children, such as rare, serious genetic diseases, the first trials in humans may be in young children. Nonclinical data may be the only source of data to provide the prospect of direct benefit in the early clinical trials. Leveraging all clinical and nonclinical data will be essential for accurate and efficient product development for children.

Session 1

11:00 AM–1:15 PM EDT

Critical Postnatal Development of the Juvenile Rat

Co-Chairs: ***Vanessa Vrolyk, DVM, MSc, DACVP,*** *Charles River Laboratories, Laval, Québec, Canada;* ***Claudine Tremblay, DVM, MSc, DACVP,*** *Charles River Laboratories, Senneville, Québec, Canada; and* ***Marie-Odile Benoit-Biancamano, DVM, MSc, DACVP, DECVP,*** *University of Montréal, Montréal, Québec, Canada*

Over the last decade, the use of juvenile animals in preclinical toxicity studies conducted for drug development has generated substantial interest. From a regulatory perspective (FDA, EMA), the use of juvenile animals is essential to perform a proper risk and safety assessment of xenobiotics intended for the pediatric population. Indeed, the pharmacokinetics, efficacy and/or toxicity can be considerably different in children or immature animals as compared to adults.

Histopathologic evaluation of juvenile animal tissues represents additional challenges for pathologists. Indeed, pathologists involved in preclinical juvenile toxicology studies must possess an excellent understanding of the normal histology of developing organs, since age-matched controls are not always available for preterminal animals. They must not only consider the expected effects from adult data, but also identify potential xenobiotic-related changes specific to organs in morphological evolution, which can include developmental abnormalities or delays.

This session aims at providing insights into the normal development of rodent organs, with a specific emphasis on the central nervous system, eyes, and reproductive organs. These tissues, which are particularly immature at birth, are subject to major developmental changes during the juvenile period and are therefore susceptible to potentially unexpected xenobiotic effects.

11:00 AM–11:05 AM EDT	**Introduction** *Vanessa Vrolyk, DVM, MSc, DACVP, Charles River Laboratories, Laval, Québec, Canada; Claudine Tremblay, DVM, MSc, DACVP, Charles River Laboratories, Senneville, Québec, Canada; and Marie-Odile Benoit-Biancamano, DVM, MSc, DACVP, DECVP, University of Montréal, Montréal, Québec, Canada*
11:05 AM–11:30 AM EDT	**Postnatal Development of the Rodent Central Nervous System** *Caroline Zeiss, PhD, DACVP, DACLAM, Yale University, New Haven, CT*
11:30 AM–11:45 AM EDT	Break
11:45 AM–12:00 Noon EDT	**Postnatal Development of the Eye in Rodents** *Vanessa Vrolyk, DVM, MSc, DACVP, Charles River Laboratories, Laval, Québec, Canada*
12:00 Noon–12:35 PM EDT	**Developmental Neuropathology in DNT (Developmental Neurotoxicity)-Studies: A Morphological Approach to Detect Maldevelopment of the Nervous System in the Rat Animal Model** *Wolfgang H.S. Kaufmann, Dr. med. vet., Consultant, Bad Dürkheim, Germany*
12:35 PM–1:10 PM EDT	**Postnatal Development of Rodent Reproductive Organs** *Eveline de Rijk, PhD, Charles River Laboratories, 's-Hertogenbosch, Netherlands*
1:10 PM–1:15 PM EDT	**Discussion/Q&A** *All co-chairs and speakers*

Session 2

1:45 PM–5:00 PM EDT

Systems Development with ADME and Clinical Pathology Considerations in Juvenile Animals

Co-Chairs: ***Paula Katavolos,*** *DVM, PhD, Bristol Myers Squibb, New Brunswick, NJ; and* ***Wendy Halpern, DVM, PhD, DACVP,*** *Genentech, South San Francisco, CA*

During the juvenile period, toxicity can result from variable target organ sensitivity and exposure to toxins based on the stage of postnatal development. This session will dive into some of the challenges associated with predicting and interpreting developmental exposure-based differences in toxicity as well as the postnatal maturation features to be considered when identifying safety signals through clinical pathology assessment. Speakers will focus on cross-species developmental features of organ systems that are critical to the absorption, distribution, metabolism and excretion of chemicals and xenobiotics. This session will specifically explore developmental considerations for the skin, GI tract, liver and kidneys and relatedly, a critical assessment of expected normal, and abnormal, clinical pathology parameters as they pertain to development. Finally, some considerations relevant to maturational differences across species will help the practicing pathologist understand the timing, progression and relevance of findings in these organ systems, and the importance of tracking differences in exposure during development even when these organ systems have not been specifically identified as targets in studies of adults.

1:45 PM–1:50 PM EDT	**Introduction** *Paula Katavolos, DVM, PhD, Bristol Myers Squibb, New Brunswick, NJ; and Wendy Halpern, DVM, PhD, DACVP, Genentech, South San Francisco, CA*
1:50 PM–2:20 PM EDT	**Postnatal Development of Skin and Adnexal Glands in Juvenile Minipigs** *Béatrice Gauthier, DVM, Sanofi, Montpellier, France*

2:20 PM–2:55 PM EDT **Postnatal Development of the Gastrointestinal Systems: Impact on ADME**
April N. Kluever, PhD, DABT, US EOP/OMB/OIRA, Washington, DC

2:55 PM–3:15 PM EDT **Maturation of the Rodent Liver: Impact on Drug Disposition and Toxicity**
Armando Irizarry, DVM, PhD, DABT, Eli Lilly and Company, Indianapolis, IN

3:15 PM–3:30 PM EDT Break

3:30 PM–4:15 PM EDT **Postnatal Development of the Urinary Tract in Rodents—Impact on ADME**
Kendall Frazier, DVM, PhD, DACVP, DABT, Consultant, Alligator, FL

4:15 PM–4:55 PM EDT **Instruction Manual for Juvenile Clinical Pathology**
Anne Provencher, DVM, MSc, DACVP, DECVP, FIATP, Charles River Laboratories, Sherbrooke, Québec, Canada

4:55 PM–5:00 PM EDT **Discussion/Q&A**
All co-chairs and speakers

TUESDAY, JUNE 29

Session 3

10:00 AM–1:15 PM EDT

Regulatory Perspectives on Juvenile Animal Toxicologic Pathology

Co-Chairs: Deepa B. Rao, BVSc, MS, PhD, DABT, DACVP, FIATP, *StageBio, Ellicott City, MD; and* ***Alan Hoberman, PhD, DABT, ATS,*** *Charles River Laboratories, Horsham, PA*

Numerous regulatory guidances have covered the conduct of juvenile animal studies. This session will provide several perspectives on these guidance documents. Dr. Alan Hoberman will provide an overview of various global regulations impacting conduct of juvenile animal studies in pharmaceutical drug development as well as chemical toxicity assessments including multigenerational and developmental neurotoxicity studies. Dr. Paul Brown from the Center for Drug Evaluation and Research, US Food and Drug Administration will focus on the recent harmonization of these guidances for pharmaceuticals, the International Council for Harmonisation (ICH) S11 guidance document, "Nonclinical Safety Testing in Support of Development of Pediatric Medicines." Two additional talks will focus on evaluation of the postnatal development of two major organ systems. Dr. Aurore Varela will cover study design and endpoints impacting the skeletal system (bone) and Dr. Brad Bolon will present a team-talk on the study design and conduct of neuropathology evaluations for the developing nervous system.

10:00 AM–10:05 AM EDT **Introduction**
Deepa B. Rao, BVSc, MS, PhD, DABT, DACVP, FIATP, StageBio, Ellicott City, MD; and Alan Hoberman, PhD, DABT, ATS, Charles River Laboratories, Horsham, PA

10:05 AM–10:45 AM EDT **Overview of Regulations Impacting Juvenile Animal Studies**
Alan Hoberman, PhD, DABT, ATS, Charles River Laboratories, Horsham, PA

10:45 AM–11:15 AM EDT **Update on International Council on Harmonisation (ICH) S11: Nonclinical Safety Testing in Support of Development of Pediatric Medicines**
Paul C. Brown, PhD, US FDA, Silver Spring, MD

11:15 AM–11:30 AM EDT Break

11:30 AM–12:15 PM EDT **Study Design and Focus on Bone Endpoints in Juvenile Toxicology Studies**
Aurore Varela, DVM, MSc, DABT, Charles River Laboratories, Montréal, Québec, Canada

12:15 PM–12:55 PM EDT **Study Design and Conduct of Neuropathology Evaluations in Juvenile Toxicology Studies**
Brad Bolon, DVM, MD, PhD, DACVP, DABT, ATS, FIATP, FRCPath, GEMpath, Inc., Longmont, CO

12:55 PM–1:15 PM EDT **Open Floor Discussion with Audience**
All co-chairs and speakers

Session 4

1:45 PM–5:00 PM EDT

Practical Interpretations in Juvenile Toxicologic Pathology

Co-Chairs: Karyn Colman, BVetMed, MRCVS, *Novartis Institutes for Biomedical Research, San Diego, CA; and* ***Brad Bolon, DVM, MD, PhD, DACVP, DABT, ATS, FIATP, FRCPath,*** *GEMpath, Inc., Longmont, CO*

This group of talks will build on previous sessions in discussing toxicologic pathology endpoints in juvenile toxicity studies. The lectures in this session will emphasize practical examples of potentially confounding developmental milestones and illustrate their importance using relevant case studies. In particular, the speakers will discuss early postnatal anatomic and physiologic attributes and their impact on the study design, tissue collection, analysis, and interpretation of xenobiotic-associated effects as manifested in the immune system, the cardiopulmonary system, the endocrine organs, and the musculoskeletal system. Conventional anatomic pathology and clinical pathology parameters used in routine toxicologic pathology practice will be addressed; selected non-pathology but essential ancillary assays (e.g., flow cytometry for immunotoxicity assessment, enzyme histochemistry for myofiber typing) will be included where warranted. Please plan to attend the Student Presentation (TBD) to cheer on a star from the next generation of toxicologic pathologists before taking a well-deserved break for coffee.

1:45 PM–1:50 PM EDT	**Introduction** *Karyn Colman, BVetMed, MRCVS, Novartis Institutes for Biomedical Research, San Diego, CA*
1:50 PM–2:25 PM EDT	**Postnatal Development of the Immune System: Impact on Pathology Interpretations** *Annette Romeike, Dr.med.vet, DACVP, Covance, Saint-Germain-en-Laye, France*
2:25 PM–3:00 PM EDT	**Developmental Immunotoxicology—Case Reports** *Jamie C. DeWitt, PhD, East Carolina University, Greenville, NC*
3:00 PM–3:15 PM EDT	**Postnatal Development and Maturation of the Cardiorespiratory System—Part One** *Melanie Greeley, DVM, PhD, DACVP, Charles River Laboratories, Ashland, OH*
3:15 PM–3:30 PM EDT	Break
3:30 PM–3:45 PM EDT	**Postnatal Development and Maturation of the Cardiorespiratory System—Part Two** *Melanie Greeley, DVM, PhD, DACVP, Charles River Laboratories, Ashland, OH*
3:45 PM–4:20 PM EDT	**Endocrine Effects in Juvenile Animals—Postnatal Development and Case Reports** *Thomas J. Rosol, DVM, PhD, MBA, DACVP, Ohio University Heritage College of Medicine, Athens, OH*
4:20 PM–4:55 PM EDT	**Musculoskeletal Effects in Juvenile Animals: Postnatal Development and Case and Class Findings** *Kathryn E. Gropp, DVM, PhD, DACVP, Pfizer Inc., Groton, CT*
4:55 PM–5:00 PM EDT	**Discussion/Q&A** *All co-chairs and speakers*

WEDNESDAY, JUNE 29

Session 5

10:00 AM–1:15 PM EDT

Clinical and Environmental Relevance of Juvenile Toxicology Studies

Co-Chairs: Catherine A. Picut, VMD, JD, DABT, DACVP, FIATP, *Charles River Laboratories, Durham, NC; and* ***Cynthia Willson, MS, PhD, DVM, DACVP,*** *Integrated Laboratory Systems, Inc., Cary, NC*

This session focuses on several environmental chemicals that affect the juvenile rat and have translational importance to certain conditions in children. Environmental chemicals, such as PFAS, cigarette and marijuana smoke, flame retardants, and organophosphates have been linked to ADHD, autism spectrum disorders, and/or cognitive deficiencies in children, with similar effects in rats. These presentations will address certain neuroendocrine disruptors and emphasize the importance of new techniques that use brain tissue as an endpoint to evaluate environmental toxins. Since the thyroid gland is paramount to normal postnatal development, one presentation will discuss evaluation of the thyroid gland as an endpoint in the perinatal and early postnatal periods. Other session topics include two clinically relevant conditions: testicular dysgenesis syndrome (TDS) and the neurotoxicity associated with pediatric anesthetics. Since TDS is of rising concern among young men, identifying this change in rats and linking it to a well-known environmental toxin may have utility in finding the cause of TDS in humans. The last presentation focuses on the need for techniques to evaluate the neonatal rat brain for the lesions associated with NMDA-antagonists or GABA-agonists used on pediatric populations.

10:00 AM–10:05 AM EDT	**Introduction** *Catherine A. Picut, VMD, JD, DABT, DACVP, FIATP, Charles River Laboratories, Durham, NC; and Cynthia Willson, MS, PhD, DVM, DACVP, Integrated Laboratory Systems, Inc., Cary, NC*
10:05 AM–10:40 AM EDT	**Flame Retardants and Organophosphates: Expanding the Classification of Endocrine Disruptors and Their Role in ADHD and Autism Spectrum Disorders** *Heather Patisaul, PhD, North Carolina State University, Raleigh, NC*
10:40 AM–11:15 AM EDT	**The Cellular Effects of Thyroid Disrupting Chemicals in the Rat Brain** *Katie O'Shaughnessy, PhD, US EPA, Research Triangle Park, NC*
11:15 AM–11:30 AM EDT	**Pediatric Anesthetic Conundrum—Detecting Accelerated Apoptosis/Necrosis in the Neonatal Rat Brain—Part One** *Lisa Lanigan, BS, DVM, PhD, DACVP, StageBio, Middletown, MD; and Odete R. Mendes, DVM, PhD, DACVP, DABT, Charles River Laboratories, Horsham, PA*
11:30 AM–11:45 AM EDT	Break
11:45 AM–12:00 Noon EDT	**Pediatric Anesthetic Conundrum—Detecting Accelerated Apoptosis/Necrosis in the Neonatal Rat Brain—Part Two** *Lisa Lanigan, BS, DVM, PhD, DACVP, StageBio, Middletown, MD; and Odete R. Mendes, DVM, PhD, DACVP, DABT, Charles River Laboratories, Horsham, PA*
12:00 Noon–12:35 PM EDT	**Phthalate Toxicity and Its Association to Testicular Dysgenesis Syndrome** *Cynthia Willson, MS, PhD, DVM, DACVP, Integrated Laboratory Systems, Inc., Cary, NC*
12:35 PM–1:10 PM EDT	**Don't Forget Dad: Paternal Preconception Smoking and Neurodevelopment in the Next Generation** *Andrew Hawkey, PhD, Duke University, Durham, NC*
1:10 PM–1:15 PM EDT	**Discussion/Q&A** *All co-chairs and speakers*

Session 6

1:45 PM–5:00 PM EDT

Unique Endpoints and Challenges in Juvenile Toxicologic Pathology

Co-Chairs: *Christopher J. Bowman, PhD, DABT, Pfizer Inc., Groton, CT; and George A. Parker, DVM, PhD, DACVP, DABT, Charles River Laboratories, Durham, NC*

This session was put together to highlight some challenging, if not atypical, aspects of juvenile toxicologic pathology. Consistent with this year's theme, the nuances and surprises that can be encountered when evaluating juvenile animals require experience and appropriate context when differentiating toxicities from normal biological changes throughout postnatal development in specific species. These presentations will address growth deficits in juvenile animal studies, potential impact of prenatal development on interpretation, case studies including postnatal developmental biology, impact on regulatory pediatric strategies, juvenile-specific toxicity, and unexpected deaths in young animals. The broad scope of examples should serve to illustrate the wide-ranging challenges and unique effects that can be encountered in juvenile animal studies.

1:45 PM–1:50 PM EDT	**Introduction** *Christopher J. Bowman, PhD, DABT, Pfizer Inc., Groton, CT; and George A. Parker, DVM, PhD, DACVP, DABT, Charles River Laboratories, Durham, NC*
1:50 PM–2:25 PM EDT	**Distinguishing Effects Due to General Decreases in Growth from Direct Organ-Specific Toxicities or Normal Variations in Growth and Development in Juvenile Toxicity Studies** *Cindy E. Fishman, VMD, PhD, GlaxoSmithKline, Collegeville, PA*
2:25 PM–3:00 PM EDT	**Prenatal Evaluations: A Prologue to Postnatal Pathology Interpretations** *Susan A. Elmore, MS, DVM, DACVP, DABT, NIEHS/NTP, Research Triangle Park, NC*
3:00 PM–3:15 PM EDT	**Impact of Existing Toxicity Data and Changing Biological Role of Nerve Growth Factor During Development on the Tanezumab Pediatric Plan—Part One** *Christopher Houle, DVM, PhD, DACVP, Pfizer Inc., Groton, CT; and Christopher J. Bowman, PhD, DABT, Pfizer Inc., Groton, CT*
3:15 PM–3:30 PM EDT	Break
3:30 PM–3:45 PM EDT	**Impact of Existing Toxicity Data and Changing Biological Role of Nerve Growth Factor During Development on the Tanezumab Pediatric Plan—Part Two** *Christopher Houle, DVM, PhD, DACVP, Pfizer Inc., Groton, CT; and Christopher J. Bowman, PhD, DABT, Pfizer Inc., Groton, CT*

3:45 PM–4:10 PM EDT **Technical Aspects of Evaluating Thyroid Gland in Juvenile Animals**
Brent Walling, DVM, DACVP, Charles River Laboratories, Ashland, OH

4:10 PM–4:50 PM EDT **Juvenile-Specific Toxicity and Unscheduled Death Pathology Interpretations**
George A. Parker, DVM, PhD, DACVP, DABT, Charles River Laboratories, Durham, NC

4:50 PM–4:55 PM EDT **Discussion/Q&A**
All co-chairs and speakers

4:55 PM–5:00 PM EDT **Closing Statement for Sessions**
George A. Parker, DVM, PhD, DACVP, DABT, Charles River Laboratories, Durham, NC

POST-SYMPOSIUM EVENTS

THURSDAY, JULY 1

All Voices Welcome: An Introduction to the Diversity, Inclusion, and Belonging Task Force

2:00 PM–3:00 PM EDT

Town Hall: Moving Toward a New and Improved Annual Symposium

4:00 PM–5:00 PM EDT

FRIDAY, JULY 23

CE1

12:00 Noon–3:45 PM EDT

Moving a Drug into the Clinic: Using PK/PD Modeling to Assess Benefit/Risk and Guide Dosing in Early Trials

(sponsored by the American College of Toxicology)

Co-Chairs: ***Ryan J. Hansen, PhD,*** *Eli Lilly & Company, Indianapolis, IN; and* ***Andrew Vick, PhD,*** *Charles River Laboratories, Ashland, OH*

The process of advancing potentially therapeutic molecules from discovery to early clinical trials can be costly, time consuming, and be associated with considerable uncertainty and risk. There are three key areas where uncertainty and risk need to be evaluated, and important decisions made regarding the future of a candidate molecule: transition to first-in-human development, predicting the human efficacious dose, and selecting the maximum recommended starting dose and dosing scheme for the first in human trial. In this session we will discuss how PKPD and other quantitative pharmacology approaches can be applied to provide a more quantitative assessment of feasibility and risk, and inform better decision making for drug candidates.

Predicting the Optimal Dose and Dose Regimen in Early Clinical Trials
Jessica Hawes, PhD, US FDA/CDER, Silver Spring, MD

The Therapeutic Index: A Tool for Informing Molecule Selection and Advancement—Potential
Jay Tibbitts, DVM, PhD, Surrozen, South San Francisco, CA

Translating PK/PD from Animals to Humans, and Predicting the Human Efficacious Dose—Potential
Brian Stoll, PhD, AbbVie, South San Francisco, CA

Leveraging Nonclinical Data to Predict Clinical Performance: Case Studies
Andrew Vick, PhD, Charles River Laboratories, Ashland, OH

FRIDAY, AUGUST 27

CE2

12:00 Noon–3:45 PM EDT

Stem Cell-Derived Therapy Nonclinical Safety Assessment

Co-Chairs: ***Kevin Keane, DVM, PhD, FIATP,*** *Novo Nordisk A/S, Måløv, Denmark;* ***Jerrold M. Ward, DVM, PhD, DACVP,*** *Global VetPathology, Montgomery Village, MD; and* ***Ricardo Ochoa, DVM, PhD, DACVP,*** *Pre-Clinical Safety Inc., Hollywood, FL*

This continuing education course will cover the nonclinical aspects of stem cell-derived therapies intended for human disease indications requiring replacement tissues such as type I diabetes, Parkinson's disease, ocular (macular) degeneration, and myocardial infarction. An introductory lecture on the current state of stem cell differentiation protocols and *in vitro* characterization will begin the course. The presentations will emphasize the design, implementation, and interpretation of nonclinical studies which are required for regulatory submissions. The topics covered will include considerations of the animal model, cell implant methods, immunological evaluation, and cell fate determination methods. Current regulatory guidances will be also covered and end-of-course panel discussion will be used to wrap up the course.

Gene Therapy via Hematopoietic Stem Cells
Curt I. Civin, MD, University of Maryland School of Medicine, Baltimore, MD

Stem Cell-Derived Models of Neurodegeneration
Valina L. Dawson, PhD, Institute for Cell Engineering, Johns Hopkins Medicine, Baltimore, MD

Regulatory Update on Nonclinical Studies with Stem Cell-Derived Products
Ricardo Ochoa, DVM, PhD, DACVP, Preclinical Safety, Inc., Hollywood, FL

Combining Stem Cell-Derived Products with Biomaterials for Long-Term Implants
Kevin Keane, DVM, PhD, FIATP, Novo Nordisk A/S, Måløv, Denmark

FRIDAY, SEPTEMBER 24

CE3

12:00 Noon–3:45 PM EDT

Applications of Artificial Intelligence and Machine Learning in Toxicologic Pathology

Co-Chairs: ***Famke Aeffner, DVM, PhD, DACVP,*** *Amgen, South San Francisco, CA;* ***Oliver C. Turner, BSc(Hons), BVSc, MRCVS, PhD, DACVP, DABT,*** *Novartis Institutes for Biomedical Research, East Hanover, NJ; and* ***Manu S. Sebastian, DVM, PhD, DACVP, DABT, ACLAM,*** *MD Anderson Cancer Center, Smithville, TX*

Artificial intelligence (AI) and machine learning (ML) are transforming all aspects of health care—including drug development. This CE course aims at introducing this technology to toxicologists and toxicologic pathologists, as well as highlighting promise and pitfalls. To illustrate the power of machine learning, the session concludes with presentations highlighting practical applications, presented by colleagues with hands-on experience.

Introduction to Artificial Intelligence and Machine Learning
Oliver C. Turner, BSc(Hons), BVSc, MRCVS, PhD, DACVP, DABT, Novartis Institutes for Biomedical Research, East Hanover, NJ

General Uses of AI in Drug Development: AI and ML in Other Aspects of Drug Development
Manu S. Sebastian, DVM, PhD, DACVP, DABT, ACLAM, MD Anderson Cancer Center, Smithville, TX

General Uses of AI in Drug Development: Overview of Partnerships Formed by Pharma with AI Companies in the Pathology Space
Bhupinder Bawa, DVM, MVSc, PhD, DACVP, AbbVie, North Chicago, IL

Implementation: Preparing Pathology Data for ML Experiments
Jürgen Funk, DVM, FTA Pathology, Roche, Basel Switzerland

Implementation: IT Infrastructure Requirements
Julie Boisclair, DVM, DES, MSc, DACVP, DABT, Novartis Institutes for Biomedical Research, Novartis Pharma AG, Basel, Switzerland

Practical Examples: Performance of the Differential Ovarian Follicle Count Using Deep Neuronal Networks
Heike A. Marxfeld, PhD, DECVP, EBVS, BASF SE, Ludwigshafen, Germany

Practical Examples: Deep Learning AI in Decision Support for the Bench Toxicologic Pathologist
Daniel G. Rudmann, DVM, PhD, DACVP, FIATP, Charles River Laboratories, Broomfield, CO

Poster Presentation Index

Poster Categories

P01: Postnatal Ozone Exposure Disrupts Alveolar Development, Exaggerates Mucoinflammatory Responses, and Suppresses Bacterial Clearance in Developing *Scnn1b*-Tg+ Mice Lungs
Ishita Choudhary, Thao Vo, Kshitiz Paudel, Radha Yadav, Yun Mao, Sonika Patial, Yogesh Saini

P02: Characterization of the *Coxiella burnetii* Whole Cell Vaccine Reactogenic Response
Alycia P. Fratzke, Anthony E. Gregory, Erin J. Van Schaik, James E. Samuel

P03: Myeloid-Cell-Specific Ablation of Anti-Inflammatory RNA Binding Protein, Tristetraprolin (TTP) Increases the Susceptibility of Female Mice to Experimentally Induced Lung Inflammation and Fibrosis
Richa Lamichhane, Thao Vo, Dhruthi Singamsetty, Ishita Choudhary, Yogesh Saini, Sonika Patial

P04: Profibrotic Effects of Bisphenol A and Its Analogues in a 3D Human Uterine Fibroid Model through TGF-beta Signaling
Jingli Liu, Linda Yu, Lysandra Castro, Yitang Yan, Natasha P. Clayton, Pierre Bushel, Erica Scappini, Darlene Dixon

P05: Role of the C-terminus and Nuclear Localization Sequence of Parathyroid Hormone-Related Protein (PTHrP) in Pancreatic Islet Morphology and Glucose Homeostasis
Ibiagbani M. Max-Harry, Shouan Zhu, Ramiro E. Toribio, Craig S. Nunemaker, Thomas J. Rosol

P06: Background Pathology in the Assessment of $Kras^{LSL\text{-}G12D}$; $Trp53^{LSL\text{-}R172H}$; Pdx-1 Cre (KPC) Mice, a Model of Pancreatic Ductal Adenocarcinoma
Stephanie L. Myers, Peter Espenshade, Cory Brayton

P07: Ectromelia Virus C15 Protein Facilitates Pathogenesis *In Vivo* by Antagonizing Innate and Adaptive Immune Responses
Elise Peauroi, Katherine S. Forsyth, Laurence C. Eisenlohr

P08: Development of a Novel AI-Based Algorithm for Abnormality Detection in the Seminiferous Tubules of Rats
Caitlin E. Brown, Jogile Kuklyte, Daniel Sammon, Dan Rudmann

P09: Nanocopper-Induced Immunopathology in Wistar Rats
Neeraj Singh Mewari, Ramswaroop Singh Chauhan

P10: Development of a Deep Learning Method for Abnormality Detection in the Rat Stomach
Sam Neal, Jogile Kuklyte, Daniel Sammon, Dan Rudmann

P11: Characterization of Resistance to PRMT5 Inhibitor Therapy in Mantle Cell Lymphoma
Mackenzie E. Long, Shirsha Koirala, Shelby Sloan, Fiona Brown, Kara Corps, JoBeth Helmig-Mason, Stacey Beck, Ji-Hyun Chung, Peggy Scherle, Kris Vaddi, Bradley Blaser, Lapo Alinari, Robert Baiocchi

P12: Normal, Procedural and Processing-Related, and Spontaneous Microscopic Findings in the Trigeminal Nerve Ganglion of Dogs, Rats, and Mice
Karen Carlton, Diana Otis, Balasubramanian Manickam, Ingrid D. Pardo

P13: Effects of Autolysis on Postmortem Evaluation of Bone Marrow
Yue (Polly) X. Chen, Annie Zimmerman, Larissa Kipa, Molly Liepnieks

P14: Sniffing Out the Truth: Anatomical, Physiological and Pathological Fundamentals of the Olfactory Tract
Lea-Adriana Keller, Sophia Niedermeier, Andreas Popp

P15: *In Utero* Ultrafine Particulate Matter Exposure Leads to Enhanced Murine Neonatal Respiratory Syncytial Virus Infection Severity
Carmen Lau, Jonathan Behlen, Alexandra Myers, Drew Pendleton, Ross Shore, Toriq Mustapha, Dennis Garcia-Rhodes, Navada Harvey, Jeremiah Secrest, Yixin Li, Renyi Zhang, Gus Wright, Aline Rodrigues Hoffmann, Natalie Johnson

P16: Developing a Deep Learning Convolutional Neural Network Method to Detect Nonhuman Primate Skin Lesions
Lauren Prince, Jogile Kuklyte, Daniel Sammon, Christiane V. Löhr, Daniel Rudmann

P17: Mechanisms of Ovarian Endocrine Disruption at Single-Cell Resolution in the *Medaka* Fish Model
Jennifer M. Cossaboon, Bruce W. Draper, Yulong Liu, Swee J. Teh

P18: Molecular Markers of Autophagy for Application in Mouse, Rat, and Human FFPE Tissues
Mathieu Marella, Kristel Buyens, Jing Ying Ma, Olulanu Aina, David La, Sameh A. Youssef, Vinicius Carreira

P19: *Moringa oleifera* Extract Extenuates *Echis ocellatus* Venom-Induced Toxicities, Histopathological Impairments, and Inflammation via Enhancement of Nrf2 Expression in Rats
Akindele Adeyi, Olubisi Esther Adeyi

P20: International Harmonization of Nomenclature and Diagnostic Criteria (INHAND): Nonproliferative and Proliferative Lesions of the Minipig
Mikala Skydsgaard, Zuhal Dincer, Wanda M. Haschek, Kris Helke, Binod Jacob, Bjoern Jacobsen, Gitte Jeppesen, Atsuhiko Kato, Hiroaki Kawaguchi, Sean McKeag, Keith Nelson, Susanne Rittinghausen, Dirk Schaudien, Vimala Vemireddi, Zbigniew W. Wojcinski

P21: Cardiac Rhabdomyoma in Two Göttingen Minipigs
Laine E. Feller, Aaron Sargeant, Bethany Balmer, Keith Nelson, Jennifer Lamoureux

P22: Repeated Inhalation of N-methylformamide Induces Multi-Organ Toxicity in F344 Rats
Mi Ju Lee, Eun-Sang Cho

P23: National Toxicology Program Individual Animal Histopathology Data Harmonization and Accessibility in CEBS Data Collections
Ying Liu, Jamie Moose, Angel Chen, David Burrows, Cari Martini, David Malarkey, Amy Brix, Ronald Herbert, Susan Elmore, Mark Cesta, Jennifer Fostel

P24: High-Throughput Screening Method for Antibodies Fit for Tissue IHC
Mathieu Marella, Sheryl Garrovillo, Joycel Nadonga, David Smith, Charley Dean, Jing Ying Ma, Vinicius Carreira

P25: Histology-Guided *In Silico* Target Expression Analysis to Support Immuno-Oncology Therapeutic Development
Ingrid Cornax, Xiang Yao, Jing Y. Ma, Rachel Goldsmith, Vinicius Carreira

P26: Development of a Deep Learning Model for Quantification of Retinal Atrophy in a Rat Model of Blue Light-Induced Retinal Damage
Christiane V. Löhr, Typhaine Lejeune, Virginie Picciuto, Lindsey Smith, Aleksandra U. Zuraw

P27: Tissue Target Expression Profiling—Timely and Decisional Quality Data in the R&D of Therapeutics
Jing Ying Ma, Mathieu Marrella, Sheryl Garrovillo, Joycel Nadonga, Charley Dean, Vinicius Carreira

P28: National Toxicology Program Histopathology and Clinical Pathology Cross-Study Data Mining in CEBSR Data Warehouse
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P30: Validation of Flow Cytometry Characterization of Lymphocyte Subpopulations in Crl:(:WI(Han) Rat Spleen by FACSVerse Flow Cytometer
Katie Belsham, Victoria Wiliams, Matthew Hartness, Claudio Petterino

P31: Effects of Delgocitinib Ointment 0.5% on the Normal Mouse Skin and Epidermal Tight Junction Proteins in Comparison with Topical Corticosteroids
Akiko Anagawa-Nakamura, Katsunori Ryoke, Yuzo Yasui, Shoichiro Sugai, Toshiyuki Shoda

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P34: Pathology of Two Ferret Models of Influenza Viral Challenge
Sarah Coe, James Justen, Natalie Spica, Keith Nelson

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Satish Panchal, Digant Amrish Patel

P36: Neuraminidase Virus-Like Particle Vaccine Reduces Virus Replication and Pathology following Influenza Challenge in Porcine Model
Ji-Hang Yin, Vasilis Pliasas, Zach Menne, Virginia Aida, Peter Neasham, James Fletcher North, Maria C. Naskou, Dylan Wilson, Sheniqua Glover, Katharine Horzmann, Ioanna Skountzou, Constantinos S. Kyriakis

P37: Historical Control Incidence of Spontaneous Thyroid Gland Lesions of Sprague-Dawley Rats Used in 26-Week Studies
Xixing Zhao, Kuldeep Singh, Rong Xu, Tiansheng Zhao

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