SAFETYMATTERS

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Aerobiology - Airing the Risk on a New Frontier

By Dr. Christopher Aston, Director, Biological Safety Programs/Chief Biosafety Officer

The COVID-19 pandemic has highlighted the critical importance of airborne infectious material in transmitting disease. Aerobiologists study the behavior and distribution of airborne microorganisms to better understand the transmission of infectious diseases and to develop strategies for prevention and control. EH&S personnel have been involved in ensuring that aerobiology research can be performed safely at Columbia.

If infectious aerosols are implicated in disease transmission, it stands to reason that disinfection of airborne microorganisms may reduce the spread of illness. Patients and dental providers will have noticed far-ultraviolet light (Far-UVC, 200-230 nm) lamps being tested at the Columbia College of Dental Medicine (CDM) clinics (pictured and https://www.cbsnews.com/miami/news/new-type-uv-light-potential-gamechanger-prevent-pandemic/). EH&S personnel developed a communication strategy with the College and Columbia researcher Dr. David Brenner, who is investigating whether these devices can reduce the number of airborne microorganisms. Air purifiers with HEPA filters have also been deployed in CDM operatories. Dr. Brenner's group in collaboration with Dr. Norman Kleiman's group are also using a more controlled laboratory environment to see whether far-UVC lamps can reduce influenza virus transmission between animals.

Aerosolized biological materials such as non-infectious viral vectors and lipid nanoparticles, similar to the Pfizer and Moderna COVID vaccines, show great promise for delivering therapeutic genes into humans to compensate for a genetic defect. In support of research efforts to investigate these properties, EH&S Biosafety Officers performed a risk assessment and generated a risk management approach for an upcoming clinical trial where Principal Investigator Dr. Emily Dimango seeks to use gene therapy to treat cystic fibrosis, a debilitating lung disease. In this scenario biological safety cabinets are not an option to contain nebulized gene therapy products that may pose a chronic exposure risk to clinical personnel administering the therapy, so the treatment room becomes the primary containment envelope and must be equipped with engineering controls that quickly clear aerosols. Personal protective equipment that offers respiratory protection also becomes a more primary line of defense.

One of the challenges of risk assessment in aerobiology is the variability and complexity of the microorganisms present in the air. Microorganisms can exist in the air within water droplets or as an aerosol and can also vary in size and shape, making it difficult to predict their behavior and effects. Additionally, the concentration of microorganisms in the air can vary depending on factors such as temperature and humidity. The environmental persistence of the microorganisms and the infectious dose required to establish an infection must also be considered. The risk posed by respiratory pathogens that have settled onto surfaces is also a factor when developing a disinfection strategy for aerobiology experiments.

Typically, aerosols are an undesirable consequence of microbiological manipulations such as vortexing of cultures and are controlled by working in a biological safety cabinet. However, some aerobiology experiments deliberately create infectious aerosols, which are used as a means to test disinfection devices. Far-UVC lamps similar to those deployed in CDM have also been shown by the Brenner group to be effective at inactivating aerosolized common cold viruses and influenza virus using a benchtop aerosol chamber. Challenge studies with infectious aerosols generate more authentic disease models in animals by recapitulating disease transmission in the natural environment, so safe laboratory facilities to study these conditions are paramount. The University's animal biosafety level 3 (ABSL-3) facility, which ensures biocontainment using negative air pressure rooms, may become a critical resource for such aerobiology research in the future.

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Celebrating Deborah Stiles Contributions to Columbia University

By Kathleen A. Crowley, Vice President, EH&S

After almost two decades, Deborah F. "Debbie" Stiles is retiring from the Office of the Executive Vice President (EVP) for Research. Debbie, the Vice President for Research Operations and Policy (VPROP), and Chief Operating Officer, played a critical role in establishing the office of the EVP for Research and has been a critical resource on matters of compliance and operations during her tenure.

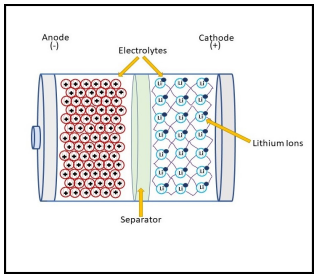
Working with the inaugural EVPR David Hirsh, PhD, Robert Wood Johnson, Jr. Professor Emeritus of Biochemistry and Molecular Biophysics, and later with EVPR Michael Purdy, PhD, Professor Emeritus of Earth and Environmental Sciences, Debbie's efforts have focused on the development and strengthening of core oversight and compliance functions and the build out of the research infrastructure needed for the University to be at the forefront of scientific discovery. As VPROP, Debbie managed multiple University-wide offices that constitute the backbone of Columbia's $1.4 billion research enterprise. These operations serve as a central resource to support the research community at Columbia and include Sponsored Projects Administration (SPA), the Clinical Trials Office (CTO), Human Research Protection Office and IRBs (HRPO), Office of Postdoctoral Affairs (OPA), Institutional Animal Care and Use Committee (IACUC), and the Office of Environmental Health and Safety (EH&S). Along with the Executive Vice President for Research, she was responsible for consolidating and restructuring these operations and improving business processes to increase efficiency and enhance client services for the research community across Columbia's five campuses. In addition, Debbie initiated the formation of offices for research compliance and training and research initiatives, and she has maintained an active leadership role in several research committees including the Stem Cell Research Committee, Institutional Biological Safety Committee, various Radiation Safety Committees, and the Institutional Health and Safety Council.

Prior to joining Columbia, Debbie was a corporate partner at the international law firm Debevoise & Plimpton where she was head of the firm's Finance Practice Group with extensive experience in its finance and private funds practices. Prior to that, Debbie was an associate at Cleary, Gottlieb, Steen & Hamilton. Debbie received her B.A. from Radcliffe College, magna cum laude, and her J.D. from Harvard Law School, cum laude.

Debbie's devotion to the research community coupled with her leadership has been essential in developing and maintaining research operations at Columbia. This was even more evident during the SARS CoV-2 Pandemic, when Debbie led the EVPR Office, never missing a beat. Thank you, Debbie!!!

Handle with Care – Avoiding Lithium Based Battery Fires with Safe Use Practices

By Olivia Salamy, Safety Advisor



Lithium-based batteries are ubiquitous in modern lives; they power everyday devices like phones, laptops, e-cigarettes, scooters, and electric vehicles. Understanding the construction of a lithium-based battery is important to help users prevent unintended battery fires. Lithium-based cells contain four main components, a negatively charged electrode (an anode), positively charged electrode (a cathode), a separator, and a flammable electrolyte. The separator has a critical role in the construction of lithium-based batteries because it creates a physical boundary between the anode and the cathode. The anode and the cathode must be separated to prevent a potential thermal runaway event. Thermal runaway is characterized by a cell in an uncontrollable self-heating state. When the anode and cathode mix, because of damage to the cell that results in a faulty separator, an exothermic chemical reaction occurs. This means energy, in the form of heat, is released from the cell. If the separator is compromised, it can also cause an internal short circuit. This means the electrical current flows through an unintended path, typically having less electrical resistance. Because the new path has little resistance, a larger current can pass through the circuit and cause damage. Therefore, a short circuit can cause a fire or a small explosion. The reaction can ignite the liquid electrolyte in the cell and cause the reaction to continue. When the temperature rises at a rate of greater than 20°C per minute, the cell has entered a thermal runaway state.

Members of the Columbia community can help to avoid the likelihood of a thermal runaway state in a battery cell by purchasing batteries and battery powered devices from reputable manufacturers, storing and charging batteries correctly and by using them as intended. Batteries that have been tested and produced by reputable manufacturers will have a UL or ETL *(continued on page 5)*

Reminder….

The Biosafety team uses this opportunity to draw attention to the important issue of Institutional Biosafety Committee (IBC) review procedures:

All research with recombinant DNA and all research with infectious agents (including viral vectors) must be reviewed by the IBC. This includes all in vitro experiments (as well as in vivo experiments in animals or human subjects).
A Rascal hazardous materials Appendix A is used to submit IBC registrations. A single registration is good for three years.

EH&S is proud to announce the upcoming release of two new training courses!

TC6800: Principal Investigator Research Safety Responsibilities and TC6850: Waste Anesthetic Gas

These courses will be released in late spring or early summer.

Researchers will be notified by email when the courses are available.

LATCH Compliance Strategy

By Phylicia Obame, Manager for EH&S Data Systems

The Laboratory Assessment Tool and Chemical Hygiene Plan (LATCH) is at the core of Columbia University's laboratory safety program. It is the laboratory-specific complement to the Columbia University Chemical Hygiene Plan and a living document that should be reviewed at least annually and revised as needed to serve as the primary resource for laboratory-specific safety information in research space(s).

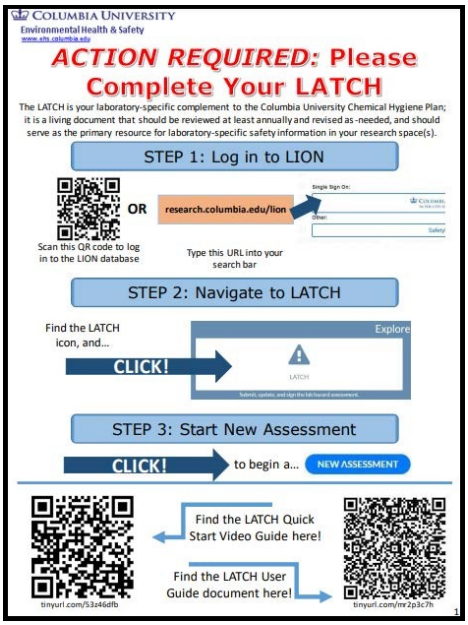
As a reminder, a Chemical Hygiene Plan (CHP) is required in accordance with OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories standard (29 CFR 1910.1450), and a LATCH is required for each lab under Columbia University policy. The University's Chemical Hygiene Plan provides an overview of the use of hazardous materials in research laboratories, their hazards, warning signs, control measures, safety training to minimize exposure, and waste management, and the LATCH is each lab's equivalent of this main plan.

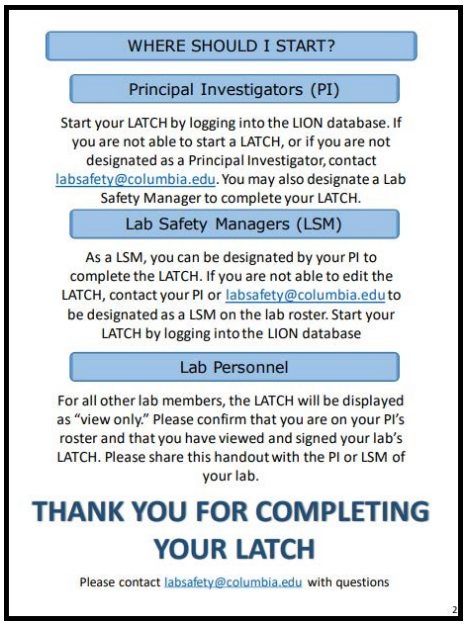
Each laboratory can complete their LATCH using the Laboratory Information Online Network (LION), a web-based software platform designed to simplify laboratory safety management between the research community and supporting departments, including Environmental Health & Safety (EH&S).

According to records in the LION system, over 70% of Columbia researchers have previously completed a LATCH, but only about 30% are current and compliant. As a result of this analysis EH&S established a LATCH steering committee to create a compliance strategy, with the main goal of continuous improvement in LATCH enrollment.

To advance this goal, the LATCH steering committee has created an outreach program consisting of communications that are sent out throughout the year to researchers that have expired LATCHs, those who are approaching expiration, and those who have never completed the LATCH. These messages contain written instructions on the next steps. As an additional outreach mechanism, Safety Advisors have strategically placed LATCH flyers (pictured below) on fume hoods in laboratories that have never completed a LATCH with these same instructions. The steering committee meets monthly to review its progress and has also created and released a LATCH Quick Start Guide in RASCAL and an updated, detailed user guide on the EH&S website and in the LION system.

Please reach out to an EH&S Safety Advisor at labsafety@columbia.edu with any questions about the LATCH.





Meet the EH&S Staff

Sebastian Flynn-Roach

Senior Manager, Research Safety Program

Sebastian Flynn-Roach, currently celebrating his fifth year at EH&S, is the Senior Manager of the Research Safety Program. Growing up in Washington Heights, he has lived near the Medical Center for twenty years. He loves Manhattan and wouldn't dream of living anywhere else. As the subway system is a way of life for this Manhattan native, he would like to see major subway systems all across America. He has been involved in laboratory safety work from his first job at an industrial hygiene testing laboratory.

Sebastian thinks he would be a great house cat, he is active, playful, and outgoing. He enjoys long walks after work, along with cooking, baking and playing video games. When it comes to his favorite team, he strays from all the NY teams and cheers for the Minnesota Vikings. Even though he looks outside of the city for his favorite sports team, his inspirational hero is a Columbia University alumnus, Don Mancini, horror film director of the Child's Play (franchise). As for a subject that Sebastian wishes he knew more about? Politics. As if Chucky isn't scary enough!

Sebastian is motivated by his career at EH&S, providing leadership to others in developing a culture of safety at Columbia University. He likes that he has the ability to inspire others to become better and to reach their goals. He is currently working on a SWOT Analysis of the Research Safety program, which he finds very interesting, as he strives for continuous improvement. His best career advice, "people don't care about how much you know, until they know about how much you care." From his first job in laboratory safety to his current position at EH&S, it is obvious that Sebastian cares about others a great deal.

Dennis Farrell

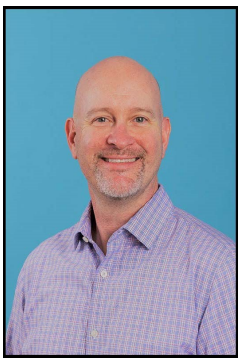
Health Physicist

Dennis Farrell is a ray of sunshine in the EH&S office. Always positive and eager to tell a funny story, he is a valuable member of the Clinical Radiation Safety Team in his position as a Health Physicist. His career with the Columbia University community began at New York Presbyterian in Radiation Oncology where he stayed for 37 years. He followed his tenure at NYP with five years at Nevis Labs and is in his fifth year at EH&S. Dennis loves his hometown of Brooklyn, NY and was fortunate to see baseball played at Ebbets Field. His favorite team is the N.Y. Mets, which he states, "proves I have a high tolerance for pain." Even though the Mets are his favorite, he also enjoys watching the Brooklyn Nets when he can catch a game at the Barclays Center.

Dennis is always on the go, enjoying one of his many hobbies. His favorite is amateur radio, and he has met people all over the world by communicating with his voice or International Morse Code. He is currently developing a fractal antenna, which increases bandwidth, allows multiband capabilities, and enables optimum smart antenna technology, for HF radio (single side band). His love for restoring electronics from bygone eras was instilled in him from his first job in the Brooklyn Museum antiquities restoration section.

Being supportive, perceptive, and optimistic, Dennis identifies with having the same personality as his best friend, Indiana (a dog he rescued while traveling through the state in the Midwest). He loves New York City and wouldn't want to live anywhere else in the world, except Rome, Italy. Dennis likes the fact he doesn't spend time looking at himself in a mirror, saying "what you see is what you get." He is motivated to move forward because you never know what's following you. His quick wit embodies the best professional advice he has ever received, "never accept boredom," since it is never boring with Dennis around!

Christopher Pettinato Reaches Milestone Marker at EH&S



Environmental Health & Safety (EH&S) congratulates Assistant Vice President Christopher Pettinato, MPH, CSP, on 25 years of service to Columbia University! In Chris' own words, he has been affiliated with Columbia his "entire adult life", from a graduate student to now a Lecturer in the Mailman School, and through his work with EH&S. Chris is a consummate safety professional who has always placed the health and safety of the Columbia community first. His expertise in the fields of industrial hygiene, hazardous materials management and occupational safety have contributed to a safer workplace for countless students, faculty, and staff over the course of his career as he has directed the University's safety programs, led emergency responses, and built award-winning waste-reduction strategies. Please join us in celebrating Chris' dedication and commitment to Columbia!

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What's That Stink?
It Could be Coming From Your Sink

By Hadler da Silva, Safety Advisor

Building infrastructure, experimental research, chemical storage and other conditions can all contribute to smells or odors in a laboratory. One common source of unpleasant nuisance odors is sewer gas that can escape through a laboratory sink or drain. Sewer gas is a complex mixture of gases which may contain methane, carbon dioxide, sulfur dioxide, and nitrous oxides as well as sometimes chlorine compounds, industrial solvents, and fuel from the sewage treatment system. Observance of these odors by laboratory personnel often leads to incident calls to EH&S. In nearly all cases, these odors, while unpleasant, are not harmful. Simple preventive measures, however, can eliminate them from occurring in the first place.

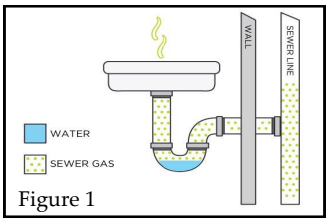

Figure 1

To prevent the leakage of sewer gases, plumbing systems contain a p-trap and vent. If a drain is not used regularly – especially hidden cup sinks and out-of-the way drains – the water held in the p-trap can evaporate and allow gas to escape (See Figure 1). Along with this, if the vent is broken or blocked, odors can permeate into the surrounding environment.

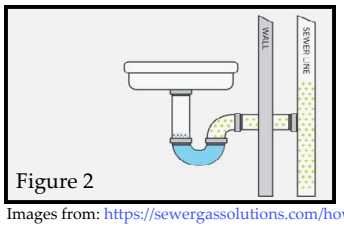

Figure 2

Images from: https://sewergassolutions.com/how-it-works/

Prevention:

To prevent sewer gases from escaping, it is important to flush sink pipes regularly to prevent the p-trap from drying out (See Figure 2). It is also important to keep the sink clear of debris that may clog the plumbing and lead to the buildup of gases. Following these practices can ensure that sewer gases don't leak into the spaces and lead to an odor concern. For more information on air quality concerns, please contact the EH&S lab Safety at labsafety@columbia.edu.

(continued from page 2) demarcation. These symbols are indicators that the battery has been tested and will perform safely, as expected. For safe storage of batteries and battery powered devices, keep them out of direct sunlight and extreme temperatures. Storing batteries in direct sunlight or exposing them to very high or very low temperatures can jeopardize their stability, potentially threatening the integrity of the separator or other internal components. All batteries should be stored away from open flames, combustible materials, and other batteries. If a battery comes in contact with another battery or with combustible material, it could cause the battery to short circuit and lead to a thermal runaway event (Underwriters Laboratory, 2021). All batteries should be transported with care and should be monitored for bulging or unexpected heating, especially as a result of impact with another object like the floor. Please follow safe purchasing, charging and storing practices when handling batteries and battery power devices, and contact labsafety@columbia.edu with any questions about battery procurement, battery use or battery disposal.

Underwriters Laboratory (2021, August 24). What Is Thermal Runaway? Electrochemical Safety

Research Institute. Retrieved April 21, 2023, from: //ul.org/research/electrochemical-safety/getting-started-electrochemical-safety/what-thermal-runaway

Children and Minors in University Laboratories

- No one under the age of 14 is allowed into a Columbia University Laboratory at any time, unless present on an organized tour or field trip for strictly observational purposes. (Even if a child is under the supervision of a parent or guardian, their presence is strictly prohibited.)
- In addition, no one under the age of 18 is allowed to handle human blood, human cell lines or "other potentially infectious materials," research animals, or be left unattended in a lab.
- Children are also prohibited from offices that are located within a laboratory.
- For more information, please refer to page five of the Guidelines for Short-term Visitors in Research-related and Clinical Activities

100%

College of Dental Medicine Student Safety Training Compliance
Can your department do the same?

EH&S Fun Fact

As of May 2023, a total of 46 X-ray generating equipment devices are in use for non-human research across all campuses of Columbia University

EH&S Milestone Anniversaries

Christopher Pettinato - 25 years
Dennis Farrell - 5 years

Radionuclide Therapies at NYP/CUIMC - The Role of the Radiation Safety Team

By Sofia Ioannidou, Senior Health Physicist

The field of radionuclide therapy has entered an exciting phase and has been proven promising in cancer therapy and pain management. This form of therapy involves the use of a radionuclide attached to an agent that selectively targets malignant cells. Once inside the cell, the radiation is released, destroying the cells and leading to the desired therapeutic effect. The most common modes of administration include oral route, intravenous injection, or target administration through arterial access. However, as radionuclide therapy involves the use of radioactive material in the patient's body, there are some safety concerns that need to be addressed. The patient becomes a moving source of radiation, which raises two major issues: external exposure and contamination from bodily fluids. This might pose a risk to staff, the general public, family members, caregivers, and the environment.

The main objective of radiation safety is to ensure that doses to the general public, a patient's family member(s), and clinical personnel remain as low as reasonably achievable. This core radiation safety principle is known as ALARA. For each radionuclide therapy patient, the EH&S radiation safety program determines, in advance, whether the patient can be safely released after treatment or if they must be admitted as an in-patient for radiation confinement and control. These criteria comply with the regulatory release requirements as outlined in the Nuclear Regulatory Commission (NRC) regulations, which mandate that the dose to any other individual from exposure to the released individual is not likely to exceed 5 mSv. Therefore, EH&S' responsibilities include but are not limited to providing expert guidance to patients during telephone and in-person consultations, and ensuring compliance with local and federal regulations while instilling confidence in personnel that good radiation safety practices are established and followed.

Specifically, interviews and consultations are performed before the treatment day to identify the patient's living conditions, post-treatment plans, arrangements, or any unusual circumstances. Patients are always provided with specific instructions tailored to their conditions to minimize the dose to healthy tissues and the individuals near them.

A member of the radiation safety team is present during the administration of the radionuclide drug to the patient. Radiation readings from the patient are recorded immediately following the end of treatment administration, enabling dose reconstruction and estimation, if deemed necessary. Calculations of exposure to other people are made while taking into account the patient's habits and patient-specific parameters, ensuring that no one receives a dose that exceeds the regulatory limit. Visitors and nurses are provided with radiation safety instructions as well.

Moreover, depending on the type of therapy and the chance of contamination, the outpatient clinic may undergo room preparation by the clinical radiation safety team. This is particularly important for cases where renal excretion is the primary concern. Sensitive areas such as the patient's bed and bathroom are covered with plastic or absorbent paper. If the patient does not fulfill the requirement for immediate release, a single, corner room is assigned, and a more thorough room preparation is carried out. Radiation safety training is provided to all involved personnel in the ward. Radiation dosimeters are also assigned to involved personnel, as needed. Following the patient's discharge, a room survey and clearance are performed and all contaminated items with radioactive material are collected and are either decontaminated or stored for decay.

In the event of unexpected incidents such as patient death or surgery shortly after the therapy, the clinical radiation safety team is prepared to respond with fast and efficient decision-making. Collaborating with other specialties is key to improving clinical services while keeping safety in mind, providing instructions to operating room personnel during surgeries, and guiding the autopsy, embalming, and crematorium personnel respectively.

In conclusion, radionuclide therapy offers a promising option for cancer and pain management. The role of the clinical radiation safety team is crucial in addressing the radiation safety concerns associated with this therapy and ensuring compliance with local and federal regulations. Patient-specific instructions are provided to meet the patient's needs. Providing expert guidance, ensuring regulatory compliance, maintaining safe working conditions, and acting compassionately while keeping safety in mind are only a few examples of the everyday tasks of the clinical radiation safety team. By employing the above measures, radiation safety can be maintained at all times, and the benefits of radionuclide therapy can be achieved without compromising the safety of patients, family members, personnel, the public or the environment.

Editorial Staff: Kathleen Crowley, Chris Pitoscia, Pam Shively, Sonia Torres
Please share questions or comments with us at **newsfeedback@columbia.edu**