Leslie R. Dye · Christine Murphy
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# Case Studies in Medical Toxicology

## From the American College of Medical Toxicology

ACMT American College of Medical Toxicology
Medical Toxicology Foundation
Springer

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*LD: For my husband, Brian, and my parents, Bernice and Ray—a perfect combination.*

*CM: Geoff, without your tolerance of the chaos around me, none of this would be possible. You are my rock.*

*DC: To my family, without whom nothing would be possible.*

*ML: This book is dedicated to my wife Ilene Claudius, and my parents Carol and Murray Levine.*

*AS: To the loves of my life, Jessica and Asher Lev.*

# Foreword

Medical toxicology, a specialty of medicine focused on the prevention, diagnosis, and management of human poisoning, is a discipline of stories. Unlike most illness, in which a disease insidiously overtakes a patient, poisoning is often a discrete, definable event. Viewed as a spectator, the event would appear as an unfolding series of foreseeable actions leading to an unintended culmination: poisoning. The child left alone with the bathroom cabinet ajar, the worker reaching for the "water bottle," the depressed patient attempting to end their anguish, the injection drug user buying from a new supplier, each representing a common scenario in which poisoning occurs. What happens next depends on many variables such as the nature, dose, and route of exposure, the size, age, and health of the patient, the set and setting, the recognition of the event, and even the availability and timely administration of the specific antidote.

Considering the many permutations, each of these unfolding stories requires skill to piece together in a logical and orderly manner. Prognosis guides expectation, and treatment quells fear. The knowledge and experience to understand the natural history of various poisonings are part of the early training necessary to become a medical toxicologist. This is a specialty of Sherlock Holmes-like detective work, in which no clues can be left untouched. Just as a single carbon separates an evening of gregarious enjoyment (ethanol) from a lifetime of blindness (methanol), no detail can be considered too small.

For several years, the American College of Medical Toxicology (ACMT), the professional organization of medical toxicologists, has held a monthly member-only, case-based webinar. During this time, I have led hundreds of participants on a journey to dissect complicated, intriguing human poisonings, while each shared their thoughts and beliefs on the how's and why's of medical management. Each case was initially selected for presentation because it was a challenge to someone, and on this basis it served as a learning tool for medical toxicologists across the USA and, often, across the world.

In this book, a group of dedicated medical toxicologists and gifted clinician educators have faithfully reproduced the case discussions, added detail, filled in blanks, and corrected errors, to allow others who were not able to engage in the initial

process to benefit from the work of the participants. The cases are anonymized, but nonetheless represent the potential for real life exposures that can, in an instant or over a decade, lead to consequential adverse effects on human health. To increase the value of the book, each case is followed by a discussion of key issues to broaden out the relevance to other medical specialties.

I want to thank the editors (Christina, Diane, Aaron, and Michael) for their tireless attention to detail. A particularly special thanks goes to the champion of the process, Leslie, for making this labor of love a reality. Hopefully their combined efforts will inspire the readers of the book to savor the intriguing tales, while reminding each of us about our tenuous relationship with the chemical milieu in which we live.

Division of Medical Toxicology,
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Newark, NJ, USA

Lewis S. Nelson

# Preface

In 2011, the American College of Medical toxicology began offering webinars to members entitled, "National Case Conference." Real medical toxicology cases were presented by people from various training programs and were moderated by seasoned medical toxicologists. The popularity and educational value were quickly recognized and the webinars continue every month. The cases are usually presented by medical toxicology fellows, but sometimes also presented by residents or medical toxicologists who are faculty members. Listeners participate by asking and answering questions.

The format used produced valuable information that the editors thought would be an excellent foundation for a book of cases. Five prominent medical toxicologists, the lead editor an immediate past president of the American College of Medical Toxicology, edited all of the included cases. In addition, the editors added questions and answers that cover various aspects of medical toxicology, to allow readers to test their knowledge on a variety of toxicology topics. At the end of each case, specialty-specific guidance was added to broaden the appeal to providers in primary care and intensive care. This volume is a necessary resource for medical students, residents, and fellows, as well as seasoned medical providers.

Cincinnati, OH — Leslie R. Dye
Charlotte, NC — Christine Murphy
Newark, NJ — Diane P. Calello
Los Angeles, CA — Michael D. Levine
Pittsburgh, PA — Aaron Skolnik

# Acknowledgements

The editors would like to acknowledge the American College of Medical Toxicology, the organizers of the National Case Conference, and, most importantly, all of the patients and healthcare workers involved in these cases.

*Disclaimer*: NCC is an educational endeavor and a quality improvement effort intended to improve patient care. The cases in this book are not intended to define standard of care. Attempts have been made to ensure HIPAA compliance.

All data and information provided in this activity is for informational purposes only. The American College of Medical Toxicology and the editors and contributors of this book make no representations as to accuracy, completeness, present acceptability, suitability, or validity of the content and will not be liable for any errors or omissions in this information or any losses, injuries, or damages arising from its display or use.

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# About the Editors

**Leslie R. Dye, M.D., F.A.C.M.T.** graduated from the University of Kansas School of Medicine and completed a residency in Emergency Medicine and fellowship in Medical Toxicology and Hyperbaric Medicine at the University of Cincinnati. She served as the Editor-in-Chief of the *Journal of Medical Toxicology*, has authored numerous book chapters, and has published extensively in the scientific literature. She currently serves as the Editor-in-Chief of Point of Care Content for Elsevier in addition to practicing addiction medicine. Dr. Dye is board certified in Emergency Medicine and Medical Toxicology and is the immediate past president of the American College of Medical Toxicology and the past president of the Medical Toxicology Foundation.

**Christine Murphy, M.D.** received both her bachelor's and master's degrees in chemistry from the College of William and Mary and her medical degree from the Medical College of Virginia. She completed her residency training in Emergency Medicine at Virginia Commonwealth University and a fellowship in Medical Toxicology at Carolinas Medical Center. She is currently an Assistant Professor at Carolinas Medical Center and Director of the Medical Toxicology Fellowship Program. Dr. Murphy is board certified in Emergency Medicine and Medical Toxicology. Her current interests include alternative uses for existing antidotes and trends in recreational drugs of abuse.

**Diane P. Calello, M.D., F.A.C.M.T.** is the Executive and Medical Director of the New Jersey Poison Information and Education System at the New Jersey Medical School of Rutgers University. She is also a member of the Board of Directors of the American College of Medical Toxicology and a regular contributor to the National Case Conference Webinar.She received her Bachelor of Arts from the College of William and Mary in Virginia and her medical degree from the New Jersey Medical School she now calls home. Her residency and fellowship training was conducted at the Children's Hospital of Philadelphia.She is board certified in Pediatrics, Pediatric Emergency Medicine,

Medical Toxicology, and Addiction Medicine. Dr. Calello is a national expert on pediatric lead poisoning, use of critical care methods in poisoning patients, and the impact of the opioid and emerging drug epidemic on the young child.

**Michael D. Levine, M.D., F.A.C.M.T.** After matriculating from the Chicago Medical School, Dr. Michael Levine completed an emergency medicine residency at the Brigham and Women's/Massachusetts General Hospital. He subsequently attended the Banner Good Samaritan Medical Center in Phoenix, Arizona, where he completed his medical toxicology fellowship. Michael Levine is currently faculty at the University of Southern California, where he serves as Chief of the Division of Medical Toxicology. His current research interests are mostly focused on toxicity from antiplatelets and anticoagulants. He is on the editorial board of the *Journal of Medical Toxicology*.

**Aaron Skolnik, M.D.** received his Medical Doctorate from the University of Pittsburgh School of Medicine and completed residency in emergency medicine at Brigham and Women's/Massachusetts General Hospital in Boston, MA. Thereafter, Aaron graduated from the medical toxicology fellowship at Banner Good Samaritan Medical Center in Phoenix, AZ, and joined the faculty of the University of Arizona College of Medicine, Phoenix. He is board certified in Emergency Medicine, Medical Toxicology, and Addiction Medicine. Currently, he is completing additional fellowship training at the University of Pittsburgh in critical care medicine, neurocritical care, and extracorporeal life support.

# Case 1
# Laundry Pod Ingestion in an Adult

1. Should we be concerned about laundry detergent (LD) pod exposures?
2. How are LD pods different from traditional LD products?
3. How should patients with LD pod exposures be managed?
4. What is being done to reduce harm from LD pod exposures?

**Abstract** Laundry detergent (LD) pod ingestion is an increasing source of morbidity and mortality in the pediatric population. However, injury associated with unintentional ingestions of LD pods by adults has not been described in the literature. We report a case of a 50-year-old man who ingested a LD pod and had esophageal and gastric injuries.

**Keywords** Laundry • Detergent • Pod • Caustics • Aspiration

## Emergency Department Presentation

Chief Complaint: 50-year-old man presents with vomiting and odynophagia.

## History of Present Illness

A 50-year-old hypertensive man who could not read English drank the contents of a Tide Pods® laundry detergent (LD) pod, mistaking it for candy. He vomited immediately after the ingestion and developed repeated emesis over the next 6 h. His



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efforts to eat and drink caused pain and repeated vomiting. The patient presented to ED 12 h after the ingestion, complaining of odynophagia.

| | |
|---|---|
| Past Medical History | Hypertension |
| Medications | None |
| Allergies | None |
| Social History | Denied drinking alcohol, smoking cigarettes, and using illicit drugs |

## Physical Examination

| Blood pressure | Heart rate | Respiratory rate | Temperature | $O_2$ saturation |
|---|---|---|---|---|
| 185/111 mmHg | 83 bpm | 16 breaths/min | 36.4 °C (97.6 °F) | 97% |

General: Lying in a gurney, comfortable
HEENT: Normocephalic with normal pupils, normal tongue, and oropharynx; no evidence of oropharyngeal burns
Cardiovascular: Regular rate and rhythm with no murmurs
Pulmonary: Symmetric breath sounds; lungs were clear to auscultation with no rales or rhonchi
Abdominal: Normal bowel sounds, soft, non-distended, and non-tender
Neurologic: Alert and oriented to person, place, and time; answered all questions appropriately
Skin: Warm and well-perfused

## Diagnostic Testing

| WBC | Hemoglobin | Hematocrit | Platelets |
|---|---|---|---|
| 9.2 K/μL | 15.2 g/dL | 45% | 223 K/dL |

| Na | K | Cl | $CO_2$ | BUN | Cr | Glucose |
|---|---|---|---|---|---|---|
| 139 mEq/L | 4.0 mEq/L | 103 mEq/L | 27 mEq/L | 16 mg/dL | 0.8 mg/dL | 98 mg/dL |

## Ancillary Testing

An esophagogastroduodenoscopy (EGD) performed in the ED revealed diffuse superficial erythema and ulcerations to the esophagus (Zargar's grade 2A) and stomach (Fig. A–D).