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HISTORY

Roots and Circles in Medical Toxicology: A Personal Reminiscence

While the taproot of medical toxicology draws heavily upon multiple disciplines of experimental, analytical, and laboratory toxicology, the laboratory of human experience is its primary domain. Evolving over the past 30 years, medical toxicology in the US has achieved recognition as a specialty concerned with the diagnosis, treatment, and prevention of disease caused by toxic substances.

My interest in toxicology dates back to 1960, when it became necessary for me to establish an experimental toxicology laboratory to respond to the requirements of the newly enacted Hazardous Substances Labeling Act. For the first time, federal law required that labels on products intended for use in the home or farm, list contents and their relative toxicity. A protocol for determination of toxicity of substances in an animal model was detailed in the regulations. A necessary component of the laboratory was the analysis of toxic substances in biological fluids. This analytical capability was soon used by the medical community in Houston as a resource for the differential diagnosis of acute poisoning. A 24-hour response system serving approximately 40 hospitals in the Houston area resulted in daily involvement in the differential diagnosis of acute poisoning.

The standard of practice in Emergency Department (ED) in the early 1960s was to call the patient's personal physician, the staff physician on call, or the resident or intern (if a teaching hospital). Since most physicians were not comfortable managing acute poisonings and most acute poisonings were self-inflicted, my expertise was utilized as a referral

resource when poisoning was considered in the differential diagnosis. These patients seemed to present to emergency departments more frequently at night, and it was during evening rounds that attending physicians seemed more anxious to transfer care.

Over several years, my practice became based more in the ED than in the laboratory. Toxic substance-related diagnostic laboratory procedures ordered through a hospital laboratory were rarely available for several days. It became necessary for me to develop simple, rapid methods of analysis for commonly encountered substances and I carried a special bag with the equipment for emergency room analyses.¹ Alcohol and carbon monoxide analyses required about 1 hour by a miniaturized microdiffusion procedure. Thin layer chromatography performed on microscope slides in Coplin jars required 10 to 15 minutes followed by immersion procedures for detection and presumptive identification of common sedatives. Application of a few drops of gastric lavage fluid to a test tube culture of live beetles resulted in death of the beetles within 15 minutes to an hour in the presence of microgram quantities of any commonly used insecticide.

A common scenario was an initial call from an ED nurse for orders for immediate care followed by travel to the site while in continuous contact by mobile phone. After immediate care and stabilization, continuing care became an issue. Since medical intensive care units were not yet generally available and the surgical recovery room often was not staffed during off hours, it became routine to remain in continuous attendance from a few hours to

several days using special duty nurses whose skills were widely variable. During this period, the malcircumstance of accidental or self-inflicted poisoning provided an opportunity to observe responses which never would have been possible in an experimental setting.²

Practice in the laboratory of human experience was professionally rewarding, resulting in profound simplification of treatment methodology: treat the patient, not the poison.³ This concept became the basis for the discussion of supportive care which appeared in the *Physician's Desk Reference* from 1975 to 1992.⁴ The financial rewards were unimpressive. Since the large majority of serious poisonings were self-inflicted, coverage by most health insurance carriers was excluded. Even where coverage was provided, the unusual nature of services rendered did not fit into the established patterns. An example from the 1960s was a child with an accidental aspirin overdose whom I attended continuously for 28 hours. Payment received from the insurance carrier was 15 dollars for one hospital visit!

Treatment information resources were few.⁵⁻¹¹ Drug manufacturers' package inserts with recommendations for treatment of drug overdose were often unreliable. At times, the treatment of choice of one manufacturer was considered to be contraindicated by another.¹² Early informational resources included substance-oriented treatment cards that were edited and distributed by Henry "Lou" Louis Verhulst, Director of the National Clearinghouse for Poison Control Centers (NCPCC). Unfortunately, this pioneering effort was sometimes compromised by communication failures. The NCPCC information cards initially resided in the ED of the Houston City/County Hospital with interns providing information to callers. When this system became burdensome, the cards were transferred to "nonmedically qualified" operators of a 24-hour medical answering service sponsored by a local medical group. Erroneous information provided to a physician concerning a pesticide ingestion resulted in diagnosis of a "benign condition" in a child who was released and died some hours later from organophosphate pesticide poisoning. In a malpractice suit, the jury held the physician harmless since he utilized resources generally relied upon by the medical community. Discontinuation of the poison information service occurred after a letter to the sponsoring organization

suggested they were practicing medicine without a license.

Recognizing a need for professional affiliation of clinical toxicologists, it became necessary for me to explore an association with many established groups: the American Industrial Hygiene Association, Society of Toxicology, and the American Association of Clinical Chemists. Toxicology papers were presented at the American Association of Poison Control Centers (AAPCC), the American Occupational Medical Association, the Drug Information Association, the Pan American Medical Association, the American Association of Suicidology, and the American Academy of Clinical Pathologists. The AAPCC most nearly approximated the needs of the physician involved in the treatment of poisoning. A limiting feature of the AAPCC from my perspective was the predominance of pediatricians among its physician members whose obvious emphasis was on accidental poisoning. Occupational poisoning, self-inflicted poisoning, and drug abuse which accounted for more than 90% of symptomatic poisonings received considerably less emphasis. In addition, a large proportion of the membership of the AAPCC were nonphysicians who were information specialists rather than patient care providers, which precluded it from being the basis from which to launch a new medical specialty.

The first step toward the creation of the American Academy of Clinical Toxicology was precipitated by my involvement in the treatment of a particular patient in 1966. I was called to participate in the care of a 2-year-old who had been admitted for dicyclanil poisoning and was being treated by an anesthesiologist in pediatric surgical recovery. Administration of Pralidoxime and small amounts of atropine had already occurred without obvious improvement. The question I consulted on was one of diagnosis and direction of pharmacologic management. A call early Sunday morning to the author of the chapter on organophosphate insecticides in the then most widely used pharmacology text evoked an admission that though he had never treated a case, he had authored the chapter by default since others with personal experience were not available at the time. Wayland Hayes, MD, a physician widely recognized in pesticide toxicology, was out of the country. Inquiry with the Communicable Disease Center led to discovery of Griffith Quinby, MD, who actually

treated a number of organophosphate insecticide poisonings. Contact with these experts over several days was helpful in patient care and emphasized the need for a network of primary care physicians directly involved in the treatment of poisoning.

During the meeting of the AAPCC in 1967, I met with four others to discuss the unique needs of the physician whose practice largely emphasized the treatment of poisoning. A consensus was reached that none of the existing organizations met our needs. The participants were Griffith Quinby, MD, a career public health service officer with special interest in pesticides; Daniel Teitelbaum, MD, with background in internal medicine, occupational medicine, and analytical toxicology; Jock Graeme, MD, the Adverse Reaction Officer for CIBA Pharmaceutical with special interest in the treatment of glutethimide intoxication; Richard Rappolt, MD, founder and editor of the new journal, *Clinical Toxicology*, and myself. We discussed the prospects for development of clinical toxicology as a medical practice specialty and the need to incorporate training in clinical toxicology in the medical curriculum. I accepted the designation of Acting Secretary-Treasurer of a new organization, the American Academy of Clinical Toxicology (AACT).

As Secretary-Treasurer of AACT, I placed notices and submitted letters to the editors of professional journals, describing the new group and inviting physician applicants.^{13,14} Personal letters of invitation to join the group were sent to authors of recent publications that reflected appropriate interests. An active interest in membership by Latin American physicians focused my attention to the existence of poison treatment centers in Latin America established years earlier and clinical departments of toxicology in medical schools at a time when few, if any, existed in the US. A suggested outline for a medical school curriculum on the treatment of poisoning was widely published.¹⁵⁻¹⁷

The founders met again in June of 1968 to formulate a tentative constitution and bylaws.¹⁸ October 22, 1968, was selected for the first meeting scheduled in Chicago, the day following the meeting of the AAPCC, recognizing that many who were interested in AACT also were members of the AAPCC and would be in Chicago. On the night of October 21, 1968, the President of the American Academy of Pediatrics strongly urged me to abandon

plans for AACT and, to instead, become a section of AAPCC, whereby his support would promote and facilitate acceptance. He further implied that we would be discredited were we to organize separately. The ensuing schism persisted for a number of years. On October 22, 1968, 52 of 87 members attended the organizational meeting of AACT.

During the morning session, several speakers discussed the functions and objectives of the Academy. Dr. Quinby discussed the need for the medical specialty of clinical toxicology which would be concerned with the diagnosis, treatment, and prevention of conditions caused by toxic substances, and would provide consultation for physicians attending poisoned patients. Dr. Teitelbaum of Denver, Colorado, proposed annual symposia as a means for the in-depth evaluation of the basic methods of therapy available to the physician for the management of poisoning. Dr. Richard Rappolt, San Francisco, California, discussed the obligations of the Academy to utilize its resources to improve the general understanding of the principles of clinical toxicology by the medical profession, and proposed an outreach program of continuing education for health care professionals. I proposed that the new Academy support the development and field trial of simple rapid analytical methods for the diagnosis of poisoning which were not limited by the use of elaborate equipment or technology.

Other speakers of the inaugural AACT meeting included Dr. Bradford Craver of the American Medical Association Drug Evaluation Section who emphasized the patient role for the AACT in obtaining meaningful data. Dr. P. F. R. deCaires, who was affiliated with Parke-Davis, discussed the problems which plagued the drug industry concerning clinical reports on adverse reactions and drug overdose, and speculated that the membership of the AACT could accomplish a great deal in improving the quality of drug toxicity data. Dr. Lee Miller of Procter and Gamble discussed the role of the Academy in assisting the industrial physician to meet the challenges he faced concerning chemical hazards. During the afternoon business meeting, the following officers were elected: Eric G. Comstock as President, Griffith Quinby as Vice President, Daniel Teitelbaum as Secretary-Treasurer. Plans were made for the first major project of the Academy, the 1969 Annual Symposium on the Treatment of Poisoning.

Table 1
Charter Membership, AACT, 12/31/68

Frank Aldrich, MD, PhD	Vernon Green, PhD	E. Plunkett, MD
C.H. Allen, MD	Gerald Gunson, MD	Rothwell Polk, MD
Herbert Anderson, Jr., MS	Charles P. Haseltine, MD	Griffith Quinby, MD
John D. Archer, MD	Ray E. Helfer, MD	R. Radeleff, DVM
Daniel Azarnoff, MD	John B. Henry, MD	Irene Raisfeld, MD
Paul F. Baranco, MD	Elizabeth Hillman, MD	Theron Randolph, MD
Eleanor Berman, PhD	F.G. Hirsch, MD	Richard Rappolt, Sr., MD
Paul W. Boyles, MD	L. Hobson, MD, PhD	William J. Rees, MD
Rowine E. Brown, MD, JD	Robert C. Hoppe, MD	Marcus Reidenberg, MD
Peter Capurro, MD	R.P. Hudson, MD	Earl T. Rose, MD
Louis J. Cella, Jr., MD	Philip Huffman, MD	Robert Rowan, MD
Paul J. Christenson, MD	Glen E. Journeay, MD	James L. Salomon, MD
P.J. Clancy, MD	K.K. Kimura, MD, PhD	Monroe Samuels, MD
Walter H. Comer, MD	G.F. Kiplinger, MD, PhD	James Schmidt, MD, PhD
Eric G. Comstock, MD	Kinya Kuriyama, MD	J.C. Schoolar, MD, PhD
Avery L. Cook, MD	Robert F. Lash, MD	Raymond Seidel, MD
Bradford Craver, MD, PhD	James Lawson, MD	S. Franklin Sher, MD
P.F.R. deCaires, MD	Theodore Lefton, MD	John E. Silson, MD
Allen J. Dennis, Jr., MD	E. Leonhardt, MD	Dennis M. Slone, MD
Norman De Nosaquo, MD	Dean LeSher, MD, PhD	David E. Smith, MD
C.H. Denser, Jr., MD	J.S. London, MD	J.T. Sobota, MD
Raoul Desjardins, MD	O.J. Lorenzetti, PhD	Jacob Sokol, MD
O. Bruce Dickerson, MD	Frank J. Lyman, MD	A.A. Stein, MD
Dwight Dill, MD	W. McCarthy, MD	Robert J. Stein, MD
Charles J. Dunn, Jr., MD	Richard McCormick, MD	Aldolf Stern, MD
Richard W. Dyke, MD	Allan McNie, MD	A.L. Strasser, MD
R. Eklund, MD	L. Massey, MD	F.W. Sunderman, Jr., MD
Herman Ellenberger, PhD	Henry Matthew, MD	Raymond Suskind, MD
Matthew Ellenhorn, MD	Jacqueline Mauro, MD	Wilmier Talbert, MD
Park Espenschade, Jr., MD	Hassan Mehbod, MD	Daniel T. Teitelbaum, MD
Carl Essig, MD	G.B. Meyers, MD	Mark Thoman, MD
Myron A. Fisher, MD	Lee H. Miller, MD	J.S. Tobin, MD
Arthur D. Flanagan, MD	F.C. Minkler, MD	Paul F. Tumlin, MD
Edgar M. Flint, MD	John B. Mitchell, MD	Thomas W. Tusing, MD
John M. Fong, MD	Howard Mofenson, MD	Julian Villareal, MD
Richard Fraser, MD	Moses Muzquiz, MD	James Weaver, PhD
Christopher Frings, PhD	D. Nelson, DVM, PhD	Sidney Weinberg, MD
Mary S. Furth, MD	Richard O'Dillon, MD	Harry Weisberg, MD
Vincent Gagliardi, MD	F.W. Oehme, DVM, PhD	F.W. Wilson, MD
Solomon Garb, MD	Ronald Okun, MD	Charles Winek, PhD
John Garrett, MD	John Palese, MD	George Wise, MD
Sander Garrie, MD	Rafael Penalver, MD	Peter Wolkonsky, MD
Jock Graeme, MD	John J. Pepper, MD	

Table 2
1969 Academy Membership
Percentage Distribution by Specialty

Internal Medicine	18%	Toxicology	< 2%
Clinical Pharmacology	11%	Pharmacology	< 2%
Pathology	11%	Anesthesiology	< 2%
Pediatrics	8%	Chemistry	< 2%
General Practice	6%	Dermatology	< 2%
Occupational Medicine	6%	Information Science	< 2%
Clinical Toxicology	5%	Neurology	< 2%
Veterinary Medicine	5%	Ob/Gyn	< 2%
Emergency Room Practice	3%	Ophthalmology	< 2%
Surgery	2%	Psychiatry	< 2%
Clinical Chemistry	2%	Suicidology	< 2%
Public Health	2%	Urology	< 2%

Jock L. Graeme, Rafael A. Penalver, John J. Pepper, Arthur A. Stein, and John S. Tobin were appointed to the Board of Directors. When the charter membership category closed on December 31, 1968, membership was at 128 (Table 1).¹⁹

Following the first AACT meeting, a vigorous campaign in the medical literature describing the organization and its objectives and encouraging participation by the medical community was initiated.²⁰ The first AACT symposium presented during the 1969 annual meeting addressed gastrointestinal decontamination and sequestration. Dr. Henry Matthew of Edinburgh and Dr. Emilio Astolfi of Buenos Aires were guests of the Academy. The Board of Directors established the position of Executive Director, to which I was appointed while Dr. Quinby assumed the Presidency. At that time the position of Executive Director was never funded by the Academy but was partially funded by a faculty appointment at the University of Texas School of Public Health and later by the Department of Community Medicine, Baylor College of Medicine.

By the end of 1969, the membership of AACT had reached 200, of which 87% were physician members and 13% nonphysician associate members (Table 2). The structure of the Academy was in place with organizational, liaison, and consulting committees. Professional support for activities of the AACT came from a 2-hour-per-year obligatory

contribution of time to retain active membership. Financial support was derived from annual dues, registration at training programs, annual meetings, supporting memberships of one thousand dollars per year by industry, and a \$118,000 contract with the Bureau of Narcotics and Dangerous Drugs to develop a nationwide Drug Abuse Early Warning program utilizing AACT participation. Developed and field-tested by the Academy from 1969 to 1971, this continues to the present as Project DAWN of the Drug Enforcement Agency.

During the 1972 meeting in Aspen, Colorado, the Board of Directors expressed disappointment with the slow rate of growth of the membership and concluded that the membership criteria should be changed to allow full membership by nonphysicians. The results of this decision were mixed. While non-physician members felt more enfranchised, many physicians left the Academy since it could no longer serve as basis for specialty boards for physicians practicing clinical toxicology. At this time, I resigned as Executive Director and turned over the responsibility for Academy affairs to the elected officers.

Continued leadership of the specialty of medical toxicology was resumed with the leadership of Ron Okun, MD, AACT President, 1974-1976, who convened a meeting in Montreal in 1974 for physicians interested in establishing the American Board of

*Table 3**Participants in Organizational Meeting,
Montreal, 1974*

Franklin D. Aldrich, MD
Regine Aronow, MD
Eric G. Comstock, MD
Alan Done, MD
John Doull, MD
Kazuo K. Kimura, MD, PhD
Albert Kolbye, MD
Yves LaCasse, MD
Walter D. Meester, MD, PhD
Albert Nantel, MD
John E. Ott, MD
Richard Rappolt, MD
Helmut M. Redetzki, MD
William O. Robertson, MD
Barry Rumack, MD
Daniel T. Teitelbaum, MD
Anthony R. Temple, MD
Clinton Thienes, MD
Mark Thoman, MD
Gary O. Wasserman, DO
Wallace D. Winters, MD, PhD

There is no documentation of participants. This list represents a consensus achieved by polling known participants.

*Table 4**Ad Hoc Board of Examiners in
Medical Toxicology, 1975*

Daniel T. Teitelbaum, MD, Chairman
Franklin D. Aldrich, MD
Frederick H. Lovejoy, Jr., MD
Albert Nantel, MD
John E. Ott, MD
William O. Robertson, MD
Mark Thoman, MD
Anthony R. Temple, MD

Medical Toxicology (ABMT). The attending physicians (Table 3) reached a consensus to move forward with the offering of a board examination in medical toxicology for physicians qualified by experience and relevant training to practice such a specialty. Since

*Table 5**First Permanent American Board of
Medical Toxicology*

Helmut M. Redetzki, MD, Chairman
Eric G. Comstock, MD
Kazuo K. Kimura, MD, PhD
Yves LaCasse, MD (Ad Hoc)
Walter D. Meester, MD, PhD
John E. Ott, MD
Clemont Richier, MD
Barry Rumack, MD
Anthony R. Temple, MD, (Ad Hoc)
Clinton Thienes, MD
Gary O. Wasserman, DO

no one was grandfathered into board certification, an Ad Hoc Board of Examiners was elected (Table 4) to develop and administer the first examinations in Kansas City at the 1975 Annual Meeting of AACT. The first permanent Board of Examiners with two Ad Hoc members (Table 5) presided over the examinations in 1976. All subsequent examinations were administered by board diplomates with a 3-year term of office and with input from diplomates concerning examination content. The interim development of 2-year fellowships in medical toxicology at a number of training centers progressed so that at present fellowship completion is a condition to qualify for the Boards.²¹

As a result of activities of the Board and its diplomates, medical toxicology was recognized as a medical subspecialty in September, 1992, by the American Board of Medical Subspecialties, who subsequently has administered the Boards. The ABMT diplomates have subsequently founded the American College of Medical Toxicology with goals and objectives closely resembling those of the original medical practice-oriented AACT prior to 1972. I am gratified to see the growth of AACT in recent years as a multidisciplinary international organization reaching a membership of over 500, according to a recent report by the President.

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