

American  
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## President's Corner

Michael McGuigan, MD



Most of you are aware of the change in the submission and review of abstracts for the NACCT meeting. I would like to provide some perspective on how we got to this point and what other behind-the-scenes changes are being made.

Historically, the Abstract Review Committee and the management staff at the Executive Office have struggled with a cumbersome and time-consuming abstract submission and review process. Originally, abstracts were submitted on paper, photocopied, and sent to reviewers who provided their comments to the Chair of the Abstract Review Committee. More recently, NACCT moved to electronic submissions via e-mail. This was a great convenience and helped to streamline the process but some questions about fairness and time utilization remained.

After due consideration, the Program Committee of NACCT decided to move to a web-based submission and review process. This service is new for NACCT 2005 and we will be monitoring

the processes very carefully. The service will be provided by Marathon Multimedia, a company with an excellent reputation for providing this service to many meetings larger than ours. The web-based process allows for website submission of the abstracts and all the related information. In addition, it allows the abstract reviewers to do their reviews on the website and track their scorings.

This year there will be twelve categories, three reviewers per category, and three "super-reviewers" who will review all the abstracts in four categories to check for uniformity and fairness of scoring. In addition, the Chair of the Abstract Review Committee (Dr. Lewis Nelson) will review each and every abstract. To help discriminate good from bad abstracts, the scoring system will be expanded from three points to five. The primary goal of these changes is to accept all good abstracts.

On behalf of the Program Committee and the Abstract Review Committee, I apologize for the lateness of this preliminary announcement. The reason for the lateness is that we are putting into place a web-based abstract submission and review process in order to streamline and improve what has previously been in place.

Your feedback on how the process worked will be greatly appreciated!

## International Union of Toxicology (IUTOX) – International Congress of Toxicology (ICT) 2007

This year, the AACT was specifically invited to submit proposals for educational sessions at the IUTOX sponsored International Congress of Toxicology XI being held in Montreal, Quebec, Canada on July 15-19, 2007. Several of our colleagues worked hard to get our submissions in on time. The titles of the AACT proposals were "Air Pollution and the Fetus", "Hepatotoxic-

ity", "New Insights Into Renal Toxicity", "Weapons of Mass Terror – Yesterday, Today, Tomorrow", "Public Perception of Toxicologic Disease: Is There a Bias?", and "Global Implications of Substances of Abuse". Whether or not these are chosen to be presented during the ICT meeting, I hope we will see some of them presented at future NACCT meetings!

**2005 NACCT**  
**North American**  
**Congress of Clinical**  
**Toxicology**

Organized by the American  
Academy of Clinical Toxicology

**September 9-14, 2005**

Orlando Grande Lakes -  
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## Famous (and Not so Famous) Events in Toxicologic History

### Socrates and Poison Hemlock

Timothy B. Erickson, MD, FACEP, FACMT, FAACT

“The man ... laid his hands on him and after a while examined his feet and legs, then pinched his foot hard and asked if he felt it. He said ‘No’; then after that, his thighs; and passing upwards in this way he showed us that he was growing cold and rigid...”

Socrates (June 4, 470 – 399 BC) was a Greek philosopher and one of the most important icons of Western philosophy. His most significant contribution to Western thought is his dialogical method of enquiry, known as the Socratic Method or elenchos, which he largely applied to the examination of key moral concepts. For this, Socrates is often regarded as the father and founder of ethics or moral philosophy. Sculptures and busts of Socrates were largely based on descriptions given by his disciple Plato, rather than on direct examination of the philosopher by artists and sculptors. There is a theory held by some historians that Socrates was a fictional character, invented by Plato himself.

Socrates enjoyed attending the Athenian Symposia and imbibing in drink-talking sessions. In vintage toxicological style, he was a legendary drinker, “remaining sober even after everyone else in the party had become senselessly drunk”. (Wikipedia) He also saw military action, fighting at the Battles of Potidaea, Delium and Amphipolis.

Socrates believed that his wisdom sprung from an awareness of his own ignorance. “He knew that he knew nothing”. Along these lines, Socrates also taught that all wrong doing by man could be attributed to a lack of knowledge. Although he never focused on one specific issue, most of Socrates’ debates centered around the characteristics of the ideal man as well as what form an ideal government should take. Socrates stressed that “virtue was the most valuable of all possessions, truth lies beneath the shadows of existence, and that it is the job of the philosopher to show the rest how little they really know.” (Xenophon)

Socrates lived during the time of the transition from the height of the Athenian Empire to its decline after its defeat by Sparta in the Peloponnesian War. At a time when Athens was seeking to recover from a humiliating defeat, the Athenian public court, conducted by three leading public figures, accused Socrates of impiety. Socrates’ philosophical methods were often imitated by the young men of Athens, which greatly upset the established moral values and order. In addition, Socrates held unusual views on religion. Many of his contemporaries were suspicious of Socrates’ philosophy as a rejection of the state religion. The leading court members convicted him on the basis that he ‘corrupted the youth’ of Athens and denied the power of the gods. The offenses charged typically did not carry the death penalty, and Socrates himself recommended to his jury that he should be fined thirty minae (the equivalent of approximately eight years of wages). However, more jurymen pushed for the death penalty rather than a simple fine or jail sentence. In accordance with his philosophy of obedience to law, he carried out his own execution, by drinking the hemlock poison provided to him. (Wikipedia) Socrates’ friends offered him an escape to Thessaly, but Socrates insisted that he could not return evil for evil. He had a duty to respect the due process of the law in the city that had nurtured him. Socrates even went into the bath chamber in order to wash and save others the task of washing his body after death. (The Phaedo)

The famous incident of Socrates’ death in 399 BC occurred when he ingested the juice extracted from a hemlock plant. The closing pages of Plato’s Phaedo provide a detailed picture of the effects of the poison upon his body. Plato describes a slowly ascending paralysis, beginning in Socrates’ feet and climbing steadily up his legs toward his chest, with his mental status remaining clear until the end. Death arrived “calmly and peacefully”. It is a gripping account, rich in drama and clinical detail. After Socrates drank the poison, “he walked about



The death of Socrates, by Jacques-Louis David (1787)

and, when he said his legs were heavy, laid down on his back, for such was the advice of the attendant”. It was the attendant or jailor named Crito who began to examine Socrates:

“The man ... laid his hands on him and after a while examined his feet and legs, then pinched his foot hard and asked if he felt it. He said ‘No’; then after that, his thighs; and passing upwards in this way he showed us that he was growing cold and rigid. And then again he touched him and said that when it reached his heart, he would be gone. The chill had now reached the region about the groin, and uncovering his face, which had been covered, he said – and these were his last words – ‘Crito, we owe a cock to Asclepius. Pay it and do not neglect it. ‘That,’ said Crito, ‘shall be done; but see if you have anything else to say.’ To this question he made no reply, but after a little while he moved; the attendant uncovered him; his eyes were fixed. Crito when he saw it, closed his mouth and eyes.” (Plato)

Socrates’ final words “Crito, we owe a cock to Asclepius; please pay it and don’t let it pass”, deserve explanation. Asclepius was the Greek God of Medicine and these words imply that Socrates felt that he owed a debt to the gods as payment for the cup of hemlock he had ingested. (The Phaedo)

Determining the exact ingredients in Socrates’ cup is difficult, for Plato never actually identified hemlock, *kōneion* in Greek, as the actual poison. He spoke only of “to pharmakon”, (the drug). The historian, Theophrastus, tells of a certain Athenian, Thrasyas of Mantinea, who discovered “a poison which produces an easy and painless end; he used the juices of hemlock, poppy and other such herbs, so compounded as to make a dose of conveniently small size.” (Theophrastus) It is evident that Socrates’ jailor crushed the hemlock, for when Socrates asked him to ‘prepare’ the poison, he used a form of the verb *tribō*, which means to crush, as in a mortar.

Hemlock’s toxicity is also referred to in other ancient texts, including the Old Testament. (Shallcross) Poison hemlock (*Conium maculatum*) is native to most parts of Europe and is now well established in the US since its introduction. It grows to heights of 6-10 feet and has fleshy white roots, which are frequently mistaken for wild parsnips or carrots. Its’ leaves resemble those of parsley. The flowers are small, white and clustered in an umbrella shape characteristic to the

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## Socrates

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Umbelliferae family. The stems are often covered with purple spots. The name 'hemlock' comes from the Anglo-Saxon *hemleac* (meaning 'shore-plant'), while its botanical name is derived from the Greek word 'konas' (to whirl about) since one of the main symptoms of hemlock poisoning is unsteadiness or ataxia. (Shallcross) In English, 'hemlock' refers not only to poison hemlock, but also to water hemlock (*Cicuta douglasii*). Through the centuries, Latin *cicuta* became virtually an English word, a synonym for all types of hemlock. Linnaeus brought order to the world of plants with his scheme of botanical classification, but paradoxically, added to the confusion regarding hemlocks. He separated Greek *kôneion* and Latin *cicuta*, assigning the name *Conium* to poison hemlock and *Cicuta* to water hemlock (Linnaeus). In light of this history, it is understandable why many have mistakenly associated seizures with poison hemlock toxicity.

Water hemlock, attacks the brain and spinal cord, whereas poison hemlock predominantly targets peripheral nerves. Socrates suffered a peripheral neuropathy, a toxin-induced condition resembling the Guillain-Barré syndrome, brought about by the alkaloids in *Conium maculatum*. Presumably, water hemlock poisoning would have produced a more unpleasant and violent demise with intractable seizures. In Plato's detailed account, convulsive activity was never described.

The alkaloids that are found in poison hemlock are known as conium alkaloids. Initially, nicotinic activation leads to nervous system stimulation. Symptoms at this stage of hemlock poisoning include: headache, unsteadiness (ataxia), salivation, diaphoresis and tachycardia. In severe cases, the stimulatory phase is followed by a depressant phase characterized by bradycardia, ascending motor paralysis, mental status depression and, ultimately, respiratory paralysis from nondepolarizing blockade at neuromuscular junctions. (Shallcross)

Plato's description of Socrates' legs as 'growing cold and stiff, or *psuchoito te kai pēgnuto* deserve discussion. In this sense, 'hot' and 'cold' did not refer to temperature, but to a level of physical and emotional energy or activity. 'Warmth' implied strength, motion, or strong feeling, whereas 'cold' suggested passivity, restraint, and lack of feeling. Thus it was not the rigid flexion of Socrates' muscles or a drop in body temperature that Plato meant to imply by 'cold and stiff,' but a lack of movement, energy, or feeling. Socrates' legs were 'stuck' or 'congealed', remaining fixed or paralyzed. (J Intern Plato Society)

In 1845, a hemlock poisoning was well described and documented by Bennett. A poor Scottish tailor named Duncan Gow had consumed a sandwich "lovingly" made for him by his children, from what they thought to be wild parsley.

"In from fifteen to twenty minutes there was loss of power in the lower extremities; but he apparently suffered no pain. In walking, he staggered as if he were drunk; at length his limbs refused to support him, and he fell. On being raised, his legs dragged after him, and when his arms were lifted they fell like inert masses, and remained immovable. There was complete paralysis of the upper and lower extremities within two hours after he had taken the poison. There was a loss of the power of swallowing, and a partial paralysis of sensation, no convulsions, but only slight occasional motions of the left leg; the pupils were fixed. Three hours after eating the hemlock the respiratory movements had ceased. Death took place in three hours and a quarter; it was evidently caused by gradual asphyxia from paralysis of the muscles of respiration; but the intellect was perfectly clear until shortly before death." (Smith)

Gow died in an Edinburgh hospital where John Hughes Bennett practiced medicine. Bennett immediately recognized the significance of the case's similarity with the death of Socrates, and he carefully interviewed all who had witnessed any aspect of Gow's demise, whether passers-by in the street, police officers, or hospital attendants. Bennett performed an autopsy on the body, sending the stomach contents to Robert Christison, who confirmed "absolutely" that Gow had ingested *Conium maculatum*. Reporting the case in great detail, Bennett emphasized its remarkable correspondence with the facts of the *Phaedo*. (Bennett)

Despite the long controversy over his demise, by examining ancient and

modern records, as well as untangling botanical and linguistic interpretations, poison hemlock could have certainly contributed to the death of Socrates. As a result, he remains not only an icon of philosophical thought, but also toxicological history.

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## IN MEMORY

### Albert Lock, Pharm.D., Ph.D.

The AACT received word that Albert Lock, Pharm.D., Ph.D., age 67, died November 1, 2004 of colon cancer. Dr. Lock had been a member of AACT since 1997. He received his doctor of pharmacy degree from the University of California at Berkeley (1962) and his Ph.D. from Oregon State University (1971). Dr. Lock also received a master of science degree from the Royal Post-graduate Medical School of the University of London in 1983. He was employed at the National Institute of Health in Bethesda, MD in the Division of

Occupational Health. His research involved the evaluation and prevention of hazards to military personnel. He also studied the effects of chemicals used by the military on the environment. Dr. Lock participated in yearly missions to Haiti with a team of doctors and nurses, participated in Doctors Without Borders, and volunteered for many other medical causes. He was a lieutenant commander in the U.S. Public Health Service reserves. Dr. Lock is survived by two sisters and two brothers.

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