It was realized that the use of diuretics should be directed only by hemodynamic monitoring.

We believe that this report is misleading in many aspects and does not contribute to the understanding of the basic problems in scorpion envenomation.

Mosche Gueron, M.D., and Saul Sofer, M.D., F.C.C.P.
Soroka Medical Center, Beersheba, Israel

REFERENCES

9. Ismail M, Abd-Elalam MA. Are the toxicological effects of scorpion envenomation related to tissue venom concentration? Toxicon 1986; 26:233-50

To the Editor:

We have a number of comments concerning the letter from Drs Gueron and Sofer:

1. The article by Gueron et al on echocardiographic and scintigraphic studies following scorpion envenomation is not yet available in any of the libraries in Israel. I am sure that Gueron et al have realized that our article was sent to Chest before their article was sent to publication.
2. The lung specimens in all the articles that were cited by Gueron and Sofer showed pulmonary edema and intra-alveolar hemorrhages that were compatible with heart failure. Direct damage to the pneumocytes or interstitial infiltrate was not shown. It is true that in this case there is no evidence of anatomic changes in the lungs (as biopsy was not done), but the appearance of pulmonary edema with normal wedge pressure suggests that there is primary lung injury.
3. The correlation between the time interval of initiation of treatment with antivenom and the clinical severity of the sting was described by Amitai et al. In rabbits, it was shown that the pharmacokinetics of the venom and antivenom are different, raising the possibility that the antivenom is ineffective. We think that this isolated finding is not enough to exclude antivenom therapy, particularly when there are data on clinical efficacy.
4. It is true that the second patient was treated with atropine in the face of tachycardia. The patient was admitted at night and was treated by the emergency room physician with this therapy. The next day, the atropine was stopped.

In summary, we are pleased that other authors did the same hemodynamic and scintigraphic studies that we did. Such an approach emphasizes the importance of the issue. Due to the fact that we are unable (as of now) to obtain the recent article by Gueron et al, it would be inappropriate for us to remark on it.

REFERENCES

5. Ismail M, Abd-Elalam MA. Are the toxicological effects of scorpion envenomation related to tissue venom concentration? Toxicon 1986; 26:233-50

Cardiac Arrhythmias during Theophylline Toxicity

To the Editor:

In the September 1990 issue of Chest, Sessler and Cohen prospectively examined the effects of elevated serum theophylline concentration on cardiac rhythm, concluding that "life-threatening arrhythmias such as [ventricular fibrillation] or cardiac arrest are rare."

Ventricular arrhythmias secondary to theophylline intoxication constitute one of the life-threatening effects of overdose. Hall et al reported ventricular tachycardia in four of 22 patients with theophylline toxicity over a wide range of serum theophylline levels. Paloucek and Rodvold, in a cumulative review of published cases of theophylline toxicity, reported ventricular tachycardia or fibrillation in 20 percent of patients with intentional overdose and 5 percent of patients with iatrogenic toxicity. This potential for ventricular arrhythmias is one reason why supportive care of patients with theophylline toxicity includes vigilant ECG monitoring.

Sessler and Cohen noted that a number of factors may influence the degree of ectopy, including underlying or coexistent conditions or illnesses, the severity of serum theophylline concentration elevation, and the route of theophylline administration. Their patient population varied in underlying disorders (including a renal transplant patient given the wrong medication), initial serum theophylline concentration (range, 31 to 72 mg/L), and route of administration (oral vs intravenous). Additional reasons to interpret their data cautiously include the relatively small patient population (n = 16), the lumping together of both acute and chronic overdose patients, the wide range in patient ages (19 to 79 years), differences in baseline medications other than theophylline, and the mean of 6 h before initiation of monitoring, during which time treatment and stabilization may have altered the frequency and types of arrhythmias subsequently seen.

Although Sessler and Cohen suggested that there is a predictable
subpopulation at risk for ventricular arrhythmias, Aitken and Martin reported that in 54 consecutive patients with serum theophylline levels ranging from 39 to 78 mg/L, there was no correlation between toxic side effects and underlying disease, patient's age, or serum theophylline level. Sessler and Cohen tempered their conclusions by noting that "further work is needed to confirm these observations in larger studies of similar design." but we feel that their conclusions may be misinterpreted and cause the reader to believe that it is acceptable not to monitor all patients who have an elevated serum theophylline level. 

Paul R. Bender, Ph.D., Jeffrey Brent, M.D., Ph.D., and Kenneth Kulig, M.D., University of Colorado, Denver

REFERENCES
1 Sessler CN, Cohen MD. Cardiac arrhythmias during theophylline toxicity: a prospective continuous electrocardiographic study. Chest 1990; 98:672-78
4 Aitken ML, Martin TR. Life-threatening theophylline toxicity is not predictable by serum levels. Chest 1987; 91:10-14

To the Editor:

Bender and colleagues contend that our conclusions that ventricular fibrillation (VF) and cardiac arrest are rare complications of theophylline toxicity may be misinterpreted and cause the reader to believe that it is acceptable to monitor all patients who have an elevated serum theophylline level. Clearly, selected cardiac arrhythmias, including not only VF and cardiac arrest but also supraventricular tachyarrhythmias and ventricular tachycardia (VT), are serious treatable complications of toxicity, and ECG monitoring plays an important role in their timely recognition. Although our data suggest that such clinically significant arrhythmias may be less common than has been generally appreciated, the sample size was modest. We intentionally avoided making recommendations for withholding ECG monitoring, and until reliable criteria to identify patients who are at very low risk for such arrhythmias are developed and validated, we support the use of ECG monitoring for all toxic patients.

We stand by our conclusions, drawn from our experience as well as the literature, that VF and cardiac arrest are rare complications of theophylline toxicity. While Bender et al seek to demonstrate that ventricular tachyarrhythmias are in fact fairly common, the literature they cite is biased toward a higher prevalence of serious toxicity than is likely to be observed in most clinical settings. Paloucek and Rodvold culled all cases of theophylline toxicity published in the English-language literature from 1975 to 1985. Since most cases that are the subject of a case report or small series represent instances of severe or unusual toxicity rather than routine cases, the overall prevalence of serious manifestations reported in that cumulative review is likely to be excessive. Hall et al described four episodes of VT among 22 consecutive cases of toxicity from intentional overdose. This report and others document that ventricular tachyarrhythmias and cardiac arrest occur primarily in acute overdose patients who have very high serum theophylline concentrations (STC) (>100 mg/L).

Although acute overdoses may account for the majority of theophylline toxicity cases reported to poison control centers, this population represents a relatively small percentage of toxic patients encountered in clinical series. Furthermore, cases reported to poison control centers are generally more likely to have severe, unusual, or problematic manifestations, whereas mild toxicity following chronic theophylline overmedication is more likely to go unreported.

In a recent series of 116 consecutive patients who presented in the emergency departments of our hospitals with an STC >90 mg/L, only 12 percent had ingested an acute overdose, and nearly half had mild toxicity following chronic overmedication. Clinically significant ventricular tachyarrhythmias (one with VF preceded by VT and another with VF) were limited to two patients who had STCs >100 mg/L following acute overdose. In another series, none of the 51 consecutive patients with STC >39 mg/L were reported to have ingested an intentional overdose, and serious arrhythmias were limited to one VT and one "presumed fatal arrhythmia." Therefore, from the perspective of the clinician (as opposed, perhaps, to poison center personnel), available evidence suggests that ventricular tachyarrhythmias and cardiac arrest are quite uncommon.

Bender et al extrapolate the findings of Aitken and Martin, who found no correlation between "side effects" and underlying disease, age, or STC, in an attempt to refute our observation that patients with frequent or complex ventricular premature beats (VPBs) tend to have advanced age and heart disease. We commented that the few well-documented cases of sustained VT reported in the literature often occurred among older patients with heart disease and/or very high STC. We made no attempt to develop a predictive index for identification of patients with VPBs or VT. Rather, we concluded that VPBs (which typically do not require therapeutic intervention) are common among theophylline-toxic patients when prolonged ECG recording is performed and that the presence of ventricular ectopy during toxicity may largely reflect underlying conditions such as chronic heart and lung disease, as has been previously demonstrated for nontoxic patients.

Bender et al imply that since Aitken and Martin found no correlation between underlying illness, age, and STC and side effects, serious toxicity, such as clinically significant arrhythmias, occurs unpredictably in all patients with theophylline toxicity. Aitken and Martin studied a specific population: middle-aged to elderly men (veterans) with very high STCs (>39 mg/L), none of whom were reported to have experienced an acute intentional overdose; thus, extrapolation of their results to other groups should be undertaken with caution. For example, whereas other studies also demonstrate a poor correlation between STC and severity of illness for patients with chronic theophylline overmedication, a recent report of the data on adult and pediatric patients with chronic overmedication demonstrated a significant correlation between advanced age and the presence of life-threatening events. Additionally, in a series of 65 consecutive toxic pediatric patients, none had ventricular tachyarrhythmias or cardiac arrest. Finally, there is compelling evidence of a strong correlation between marked STC elevation (>100 mg/L) and high risk of life-threatening events, including ventricular tachyarrhythmias, for patients with acute overdose. Thus, a variety of factors, or a combination of factors, may influence the risk of developing clinically significant arrhythmias.

Telemetry beds are in short supply in many hospitals. Thus, it is important to strive to identify the populations of theophylline-toxic patients in whom clinically significant cardiac arrhythmias are expected (and in whom close monitoring is therefore mandatory) and those in whom such arrhythmias are highly unlikely to occur (and in whom ECG monitoring might therefore be omitted). In addition to ventricular tachyarrhythmias, supraventricular tachyarhythmias are important manifestations of toxicity, which are probably more common, may be poorly tolerated hemodynamically, and may necessitate antiarrhythmic therapy. Although VPBs are frequently considered to be serious or life-threatening complications of toxicity, such ectopy rarely requires therapeutic intervention or