Title: CAN WE BELIEVE PLASMA CYANIDE LEVEL MEASUREMENTS?

Authors: A.P. Van Etten, M.S., S.S. Triantis, B.S., B.C. Bloor, Ph.D., S.W. Stead, M.D., and W.E. Flacks, M.D.

Affiliation: Department of Anesthesiology, U.C.L.A. School of Medicine, Los Angeles, California 90024

Introduction. The release of cyanide by sodium nitroprusside (SNP) is a well-documented fact. Previously published data include plasma CN⁻ levels. However, the analytical recovery of CN⁻ from spiked samples has not been examined systematically. There are reports that indicate that CN⁻ is "lost" when incubated with plasma or albumin. In this study, we tested the loss of CN⁻ from spiked samples of dog plasma, as well as from human, dog, and rabbit albumin solutions.

Methods. 0.8 µg CN⁻ (as NaCN) was incubated either in dog plasma or in albumin solutions (human, dog or rabbit, 40 mg/ml in phosphate-buffered saline, pH 7.5). The incubation was carried out in 1 ml aliquots at room temperature for a maximum of 90 min. At the time points indicated in Figures 1 and 2, the aliquots were treated with 0.2 ml 4 M H₂SO₄. The HCN was then formed by N₂ fixation to a trap of 1.0 ml 1 N NaOH. The extraction was carried out for 1 hr at room temperature. The trapped CN⁻ was then assayed spectrophotometrically by the method of Boxer and Richards.

Results. Fig. 1 shows the recovery of CN⁻ from dog plasma. Although greater than 95% recovery was found at 0 min, only 65% of the CN⁻ was recovered after incubation for 60 min, while 40% was recovered after 90 min. Similar losses occurred when CN⁻ was added to human, dog, or rabbit albumin and incubated at room temperature (Fig. 2). Also shown is the recovery of CN⁻ from the buffer used to dissolve the albumins.

Discussion. CN⁻ concentration in samples at room temperature changes rapidly. The loss of CN⁻ when incubated in the buffer is presumably due to volatilization. Initially, the loss of CN⁻ is very rapid (35% in 15 min), then slows. Thus, significant losses of CN⁻ may occur during the time it takes to collect, centrifuge and draw off a plasma sample. While the determination of CN⁻ is not a problem, its preservation during extraction from plasma is subject to error as described above. Thus, until methodologies are improved, data from plasma CN⁻ assays are likely to be inaccurate.

REFERENCES

1. Michenfelder JD, Tinker JH: Cyanide toxicity and thiosulfate protection during chronic administration of sodium nitroprusside in the dog. Anesthesiology 47:441-448, 1977


![Cyanide Loss When Incubated in Plasma](image1)

![Cyanide Loss When Incubated in Different Albumins](image2)