Basrah Journal Of Surgery

Short Communication
Bas J Surg, March, 19, 2013

THE IMPORTANCE OF SERUM BROMIDE DETERMINATION IN THE CLINICAL LABORATORIES

RIYADH J FAKHRULDEEN
PhD. The Royal Society, Amman, Jordan.
E-mail: drreyad49@yahoo.com

The first use of Bromide as a treatment was for human epileptics over 200 years ago as or potassium bromide (KBr). Over the passage of time and the discovery of new anticonvulsants, KBr apparently became less popular due to the hepatotoxicity of bromide. Once in the brain, the bromide component becomes negatively charged ions and causes the brain cells to be also negatively charged. It is this negative state which seems to inhibit the excitability of neuron cells and helps to prevent the cells of the brain from firing in a random and haphazard manner[1] .

Lethargy, sedation and ataxia (lose of coordination) are quite common side effects of KBr. Serum bromide levels should be monitored 1-2 months after treatments has begun[2].

Halothane (trademarked as Fluothane) is an inhalational general anesthetic agent containing a bromine atom[2]. Toxic effects of halothane include malignant hyperthermia and hepatitis[2]. Rice, S.A. etal[3] have been strongly suggested that hepatic injury following halothane administration can be caused by intermediates of oxidative metabolites (trifluoroacetic acid and bromide). Approximately 25% to 45% of the absorbed halothane undergoes oxidative metabolism (trifluoroatic acid and bromide)[4,5]. Two types of halothane hepatotoxicity have been described; type 1, or mild hepatitis, is associated with elevated transaminase levels and self-limiting symptoms, and type 2, or sever hepatotoxicity, is associated with acute fatal liver failure[6,7].

From what has been discussed above, the demand for bromide measurement in human serum by the clinical laboratories is of vital importance. A number of laboratory methods have been used for serum bromide determination[8-28]. From analytical chemistry point of view, all these methods were tedious (serum pretreatment was very necessary), not accurate or precise particularly for the detection of low levels of serum bromide. Since the initial serum bromide level is very low and to avoid the accumulation of bromide in blood, a sensitive and low detection method (without sample pretreatment) for bromide determination in any clinical laboratory as daily laboratory findings is of great necessity.

The up-to-date method for serum bromide (and urine) determination is by inductively coupled plasma Atomic Mass spectrometry (ICP-MASS)[29].

Atomic ICP-Mass was for serum bromide and other anions in most hospitals in the western countries for the last fifteen years with excellent results (urine specimen was used as well). ICP-Mass is a good tool for serum bromide and iodide without the tedious sample pretreatment procedure[29]. ICP-Mass spectrometry since the early 1980_s, has grown to be one of the most important technique for elemental analysis because of its low detection limits for the most elements, it's high degree of selectivity and it's reasonably good precision and accuracy[30-34].

For accurate, precise and rapid laboratory technique for serum and urine bromide (and other anions) measurements in any clinical laboratory, I highly recommend ICP-Mass spectrometry to be used.

The vital importance of daily checking of serum (and urine) bromide for a number of patients, and the surgery theater staff (anesthesiologists, surgeons, and nursing staff), encouraging us to put an emphasis for supplying the clinical laboratories with ICP-Mass spectrometer.

At the mean time, I'm proceeding in measuring serum bromide level for number of selected subjects who are exposed to halothane, or on bromide containing treatment.

References

1. Dodds,W.J., and carson, J., JAVMA, 2009, 234; 1425-1431.
2. Drug Bank DBO1159.
3. Rice, S.A., Maze, M., Smith, C.M., Kosek, J.C. and Mazze, R.I., Toxicol. Appl.Pharmacol. 1987, March, 15, 87(3); 411-9.
4. Book, complication in Anesthesiology, Lobato, E.B., Gravenstein, N., and Kirby, R.R., publ. Lippincott Williams and wikins (wolters Kluwer).
5. Johnston,M., Br.J.Anaesth., 1952, 28(9), 392-410.
6. Lindenbaum, J., , Leifer, E., N.Engl. J.Med. 1963,268,525-30.
7. Kumar, G.P., Bhat,V.J., Sowdi, V., J.clin. Forensic Med., 2005,12(5), (272-3).
8. Dulop, M.J. , clin.pathol., 1967,20,300.
9. Underwood, P.J., Aust.J. Exp.Biol Med. Sci., 1967,45,577.
10. Bowen, A.J.M., Biochem.J., 1959, 73,381.
11. Ohno, S., Analyst, 1971,96,453.
12. Malvano, R., and Grosso, P.,J. Nucl. Biol. Med., 1968,12, 86.
13. Blotcky, A.J., Duvan, D.M., Grauer W.M., and Rack, E.P., Analy, Chem., 1974,46,838.
14. Rechnitz, G.A., Krez, M.R., and Zamochnick, S.B., Anal.chem., 1966,38,973.
15. Morin, P.P., Caroff, J., Savina, A., Thomas, J., Lahellec, M., and Morin, J.F., Ann. Biol. Clin., 1975, 33,89.
16. Degenhart, A.J., Abeln, G., Bevaare B., and Baks, J., clin. Chim. Act 1972,38,217.
17. Vallon, J.J., pegon, Y., and Accominotti, M., Anal. Chim. Acta., 1980, 120, 65.
18. Luther, G.W., Branson Swartz, C., and Uthman, W.J., Anal. Chem., 1988, 60, 1721.
19. Doedens, D.J., J.Anal. Toxicol., 1985, 9, 109.
20. Fernandez, S.J., Murphy, L.P., and Rankin, R.A., Anal Chem., 1984, 56, 1285.
21. Archer, A.W., Analyst, 1972, 97, 428.
22. Miller, M.E., and capon, C.J., clin. Chem., 1984, 30, 781.
23. Goewie, C.E., and Hogendoorm, E.A., J. Chromatog., 1985, 344, 157.
24. Han, K., Koch, W.F., and Prott, K.W., Anal. Chem., 1987.
25. Sky-Peck, H.H., and Joseph, B.J., Clin. Biochem., 1981, 14, 126.
26. Rastegar, F., Maier, E.A., Heimburger, R., christoph, C., Ruch, C., and Leroy, M.J.F., clin. Chem., 1984, 30, 1300.
27. Buresch, O., Honle, W., and Schnering, H.G.V., Fresenius, Z., Anal. Chem., 1986, 325, 607.
28. Vaughan, M.A., and Horlick, G., Appl. Spectrosc., 1986, 40, 434.
29. Allain, P., Mauras, Y., Douge, C., Jaunalt, L., Delaporte, T., and Beaugrand, C., Analyst, June, 1990, Vol. 115.
30. Jarvis, K.E., Gray, A.L., and Houk, R.S., Handbook of Inductively coupled plasma Mass Spectrometry, New York, Champan and Hall, 1992.
31. Montaser, A., and Golightly, D.W., Inductively coupled Mass Spectrometry, 2nd ed., Eds. New York, VCH Publisher, 1992.
32. Houk, R.S., Anal. Chem., 1980, 58, 97A.
33. Olesik, J.W., Anal.Chem., 1991, 63,12A.
34. Vela, N.P., Olsan, L.k., and Caruso, J.A., Ana. Chem., 1993, 65, 585A.