Bromide

Atomic number 35
Atomic weight 79.90

Collection

Serum 2 mL Plastic tube Anticoagulant: none

Reference ranges

			Reference
Serum/plasma	mmol/L	0.025 – 0.078	1,2
Blood	mmol/L	0.031 – 0.101	3
Urine	mmol/mol creatinine	Male 7.7 (95th percentile) Female 9.85 (95th percentile)	4

Interpretation		Serum/plasma		Reference
Bromide salts:	Therapeutic range	mmol/L	9.4 – 18.7	5
	Toxic values. Individual responses may vary widely: toxic effects can be seen at concentrations well below those stated	mmol/L	Greater than 15.6	5
Methyl bromide:	Occupational exposure limit	mmol/L	Less than 0.15	6
	Significant exposure to methyl bromide	mmol/L	Greater than 0.38	7-9

References

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Clinical

Bromide salts were introduced as hypnotic sedatives in 1850 and a few years later for the treatment of convulsive seizures. Nowadays, modern anti-epileptics such as carbamazepine, sodium valproate and lamotrigine are the mainstay treatment for epilepsy, however, bromides are still used in a small number of patients with seizures intractable to other drugs, predominantly in paediatrics. Bromide salts are also occasionally contained in small quantities in other medicines or dietary supplements and rarely, toxicity to bromide has resulted from excessive consumption.

Since bromide in serum has been reported to interfere with methods for the measurement of serum chloride, leading to apparent hyperchloraemia, and contributes to an increased negative anion gap, these findings in the presence of neurological or neuropsychiatric effects should arouse suspicion of inorganic bromide poisoning.

Alkyl bromides, in particular methyl bromide, were a widely used fumigant in the control of insects, weeds and rodents. However, due to the adverse effect on the environment and the unacceptable risk posed to health, their use was prohibited within the EU from 2010 unless authorised by the Commission for emergency use. Alkyl bromides are yet to be completely phased out in all parts of the world. Methyl bromide is a colourless gas and exposure is primarily through inhalation. Symptoms of methyl bromide toxicity include pulmonary oedema, neurological effects, such as headaches, dizziness, weakness, speech impairment, numbness and tremors, and kidney damage in extreme cases. With alkyl bromides, the hazardous component is actually the alkyl radicals released by molecular fission rather than the inorganic bromide component. Bromide ions, however, are the only part of the compound readily measurable and thus may be useful in suspected/known exposure to alkyl bromides. It should be noted though that the bromide concentrations of concern are much lower than if the exposure had been to bromide salts.

Toxicity

With the limited use of bromide salts as anti-epileptics and the steep decline of use of bromide in other medicinal preparations, bromide toxicity is now rarely seen. When it does occur, termed “bromism”, the manifestations are predominantly neurological, including lethargy and psychiatric disturbances, such as delirium and hallucinations, and dermatological, often skin rashes or acne form dermatitis. Other symptoms which may be seen include tremor, dysarthria, ataxia and abnormal eye movements.

The toxicity to the central nervous system from bromide is thought to arise from the replacement of chloride with bromide in nerve transport mechanisms, stabilizing the membrane and impairing nerve transmission. Hence treatment of symptomatic bromide toxicity involves chloride replacement, diuresis and in severe cases, haemodialysis.

Bromide can also interfere with iodine metabolism, enhancing the effects of marginal iodine deficiency.

Laboratory indices of exposure

Therapy with bromide salts may be monitored using serum bromide measurements and a therapeutic range of 9.4 – 18.7 mmol/L is cited. However, toxicity may be evident at concentrations as low as 5 mmol/L. At concentrations in excess of 35 mmol/L, action should be taken to prevent further increase as there is risk of coma and fatality.

Since bromide has a long half-life of 12 days in blood, 6-8 weeks are required to reach steady state levels. Body uptake and excretion of chloride strongly influences bromide excretion and, for example, a decreased intake of salt can reduce bromide excretion markedly.

Serum bromide may be used to indicate exposure to alkyl bromides, for example, in occupational workers or where the gas has been inadvertently released. Measurement is useful for confirming exposure and levels may correlate with the clinical severity of poisoning within the first 1-2 days following exposure. However, serum bromide concentration rapidly returns to normal and delayed measurement gives results that do not predict the clinical course.

Since bromide is an indirect marker for exposure to methyl bromide, much lower levels of serum bromide indicate significant exposure compared to the case with inorganic bromide and a biological occupational exposure limit in blood of 0.15 mmol/L is recommended. While a serum bromide concentration of less than 1.0 mmol/L has been found to be often associated with no clinical signs and between 1.9 and 5.0 mmol/L with moderate to severe symptoms, a wide variation in the bromide levels associated with lethal

exposure has been reported (fatal exposure at 0.38 mmol/L yet non-lethal exposure with concentrations in excess of 2.5 mmol/L). However, this may partially be confounded by the different timings post exposure at which the bromide levels were measured.

References

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