Toxicity of local anaesthetics has a direct effect on nervous tissue. This toxicity is determined by various factors such as site of injection, concentration of the agent and whether it is ionic or non-ionic. Also, additives of vasoconstrictive agents, both catecholamine and non-catecholamine may be used.

*"**All local anesthetic molecules at sufficient concentration are directly cytotoxic to nerve cells"(i)***

Powell and Myers ([i]) assessed local anaesthetic toxicity on rat sciatic nerves and found that "both nerve injury and edema increased with concentration."

Burm ([ii]) noted that epidural doses must be much higher than spinal doses, due to the uptake into extraneural tissues and systemic absorption.

Professor Ginther of UC Irvine Medical Centre mentions

"peripheral neurotoxicity such as prolonged sensory and motor deficits"

in his Internet discussion on toxicity of local anaesthetics.

This has been hypothesised as being due to a combination of low pH and the preservatives such as sodium bisulfite in the mixture. Indeed, a recent case of adhesive arachnoiditis following bupivicaine containing preservatives was cited by Uefuji([iii]) in Japan

Malinovsky ([iv]) discusses the various causes of neurological lesions, including direct trauma of the spinal cord and nerve roots, compromised spinal cord perfusion and direct neurotoxic effect.

He suggests that

"neurotoxicity can result from decrease in neuronal blood supply, elicited by high concentrations of the solutions, long duration exposure to local anaesthetics, and the use of adjuvants."

He advocates several measures to reduce the incidence of neurotoxicity: use of the lowest efficient dose, avoidance of repeated or large volume injections and use of preservative-free solutions. As early as 1954, Moore ([v]) advised that local anaesthetic administered epidurally should be free of preservatives.

[i] Powell HC, Myers RR Journal of Neuropathology and Experimental Neurology 1993 52:3,234-240

[ii] Burm AG Clin Pharmacokinet 1989 May;16(5):283-311 Clinical pharmacokinetics of epidural and spinal anaesthesia.

[iii] Uefuji T Masui 1999 Feb;48(2):176-80 [Persistent neurological deficit and adhesive arachnoiditis following spinal anesthesia with bupivicaine containing preservatives]

[iv] Malinovsky JM, Pinaud M Ann Fr Anesth Reanim 1996; 15(5): 647-58 [Neurotoxicity of intrathecally administered agents.]

[v] Moore DC, Hain RH JAMA 1954 156: 1050-1053 Importance of the perineural spaces in nerve blocking