Introduction. Pregnancy is associated with physiologic changes in various organ systems. For example, changes in the central nervous system (CNS) manifest as 25 to 40 percent reductions in the minimum anesthetic requirements for volatile anesthetics. Altered response to local anesthetics are suggested by the development of seizures in a parturient who received an inadvertent intraperitoneal venous injection of 40 mg of bupivacaine during performance of a lumbar epidural block. Similarly, we have observed a parturient who developed seizures following inadvertent intraperitoneal venous injection of only 25 mg of bupivacaine. These responses to low doses of bupivacaine might represent an increased sensitivity of the parturient to the toxic effects of local anesthetics. Therefore, we undertook this study to determine the median convulsive dose (CD 50) of lidocaine and bupivacaine in pregnant and non-pregnant female mice.

Methods. Pregnant and non-pregnant Charles River CD-1 female adult mice (8 to 10 weeks) weighing approximately 30 grams each were utilized in this study. The median convulsive dose (CD 50) following intraperitoneal injection of lidocaine was determined in 100 term pregnant (17 days) and 50 non-pregnant mice. Likewise, the CD 50 following intraperitoneal injection of bupivacaine was also determined in 50 term pregnant (17 days) and non-pregnant mice. The CD 50s in pregnant and non-pregnant mice were compared for statistical significance utilizing probit analysis.

Results. Within a few minutes following the Intraperitoneal injection of the local anesthetics the mice were noted to develop ataxia, aimless running movements, and inability to assume the prone position from supine position. They were recognized to have convulsions when they had jerky movements of the neck and abdominal muscles plus tonic and clonic contractions of the lower extremities. The CD 50 for lidocaine in non-pregnant and pregnant mice were 83 and 61 mg/kg (Fig 1) and for bupivacaine 47 and 30 mg/kg (Fig 2) respectively. The differences in CD 50s in non-pregnant and pregnant mice for both the local anesthetics were found to be statistically significant (p < .05).

Discussion. Pregnancy is associated with alterations in the epidural hemodynamics, water retention, protein binding of the local anesthetics, hormonal changes, and changes in the nervous system such that a pregnant patient is more likely to develop convulsions following intraepidural venous injection of local anesthetics than a non-pregnant patient. Jorfeldt et al based on animal studies predicted that in a non-pregnant individual it would take a plasma concentration of 4 ug/ml of bupivacaine to produce convulsions. Ryan et al observed convulsions in a pregnant patient following inadvertent intraepidural venous injection of 40 mg of bupivacaine (plasma level 2.3 ug/ml). Thus it would seem pregnancy may be associated with increased sensitivity to local anesthetic induced CNS toxic reactions. The results of this study seem to support the above mentioned opinion.

References.