

Title : THE DURATION OF ACTION OF NERVE BLOCKS PRODUCED BY LOCAL ANESTHETIC: DEXTRAN MIXTURES.

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Introduction. Does the presence of dextran in a local anesthetic mixture prolong the duration of the nerve block produced by the local anesthetic? The evidence is conflicting. When used clinically for intercostal blocks(1,2), and experimentally in rat coccygeal nerve blocks(4) this has been reported to be the case, but not when used for ulnar nerve block(3). We have performed a double blind study of the duration of action of dextran:local anesthetic mixtures, in a standardized nerve block in the rat, in an attempt to resolve the problem.

Methods. The test mixtures are given in Table 1. All solutions were from commercially available ampoules and the mixtures had similar Na contents and pH. Lightly anesthetized rats (500-600gm.) had a special jig placed in the mouth and a 30G. needle introduced, stereotactically, down to the left infraorbital nerve. With the investigator unaware of the composition of the mixture 0.2ml. was injected, over 10 secs. and the animals subjected to the test stimulus, a firm pinch to the upper lip, at 15 sec. intervals for 1 min. Only those animals who lost the withdrawal response to stimulus during this period were deemed to have a block and were further subjected to stimulation, at 5 min. intervals until the return of the response to stimulus on the blocked side. The animals who did not get a block were rested for an hour, reinjected on the left with 0.2 ml. 1% lidocaine, and the resultant blocks monitored as the test blocks were. Statistical analysis was by unpaired Student's t test.

Results. Table 1. Effects of dextran upon mean duration (min. \pm S.D.) of rat infraorbital nerve block.

GROUP	SOLUTION	DURATION	n
A	0.9% NaCl	No Block	10
B	5% dextran 40 \pm 0.9% NaCl	No Block	10
C	1.0% lidocaine + 0.9% NaCl	109 \pm 26.8	10
D	1.0% lidocaine + 5% dextran 40 and NaCl	117 \pm 20.3	10
E	0.25% bupivacaine + 0.9% NaCl	138 \pm 23.8	10
F	0.25% bupivacaine + 5% dextran 40 and 0.9% NaCl	111.5 \pm 39.8	9

C vs D; NS. E vs F; NS. C vs E; $p < 0.01$.
D vs F; NS.

None of the animals receiving 0.9% NaCl (A) or dextran alone (B) had any evidence of a block (Table 1). In a group receiving a single local anesthetic (C+D, E+F), the dextran containing solutions did not produce a

significantly greater duration of block. The animals receiving 0.25% bupivacaine and 0.9% NaCl (E) had a significantly longer duration of block than those receiving 1% lidocaine and 0.9% NaCl (C) ($p < 0.01$). The duration of action of the lidocaine (D) and bupivacaine (F) solutions containing dextran were not significantly different.

Table 2. Duration (min. \pm S.D.) of rat infraorbital nerve blocks with 1% lidocaine one hour after sham blocks with 0.9% NaCl or 5% dextran 40 and 0.9% NaCl.

SOLUTION	n	DURATION
0.9% NaCl	10	106.7 \pm 24.4
5% dextran 40 in 0.9% NaCl	10	77.5 \pm 26.6

$p < 0.05$

In the animals which received sham blocks with dextran (Table 2) the duration of block with 1% lidocaine was significantly shorter than those which had a sham block with 0.9% NaCl ($p < 0.05$).

Discussion. Using this animal model and the stated concentration of drug we found that dextran did not prolong the nerve block produced by a local anesthetic. In agreement with other investigators(2,3) we found that dextran in itself did not produce a nerve block. If dextran forms a complex with a local anesthetic and exerts a 'depot' effect prolonging the action of the drug, as has been suggested(2), dextran injected before the local anesthetic should also produce a 'depot' effect. Our results show no such effect, dextran neither prolonged the block when mixed with the local anesthetic nor when injected prior to the local anesthetic. In conclusion, when tested in the standardized infraorbital nerve block of the rat, dextran failed to prolong a local anesthetic block or to produce any evidence of a 'depot' effect.

References.

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