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## Injectible dispersion of $\Delta^9$ -tetrahydrocannabinol in saline using polyvinylpyrrolidone

The intravenous administration of  $\Delta^9$ -tetrahydrocannabinol ( $\Delta^9$ -THC), an active principle of marihuana, is complicated by the extreme insolubility of the compound in aqueous media. We wish to report a preparation which appears to be well tolerated physiologically and is stable physically and chemically over extended periods of time.

This medium consists of a dispersion of  $\Delta^9$ -THC in normal saline using polyvinylpyrrolidone (PVP) as a carrier.

A suspension in the amount of 100 ml containing 1 mg  $\Delta^9$ -THC/ml is prepared as follows: 40 ml of an ethanol solution containing 100 mg  $\Delta^9$ -THC (a standard preparation of synthetic  $\Delta^9$ -THC as distributed by the National Institute of Mental Health) is mixed with 30 ml of a 10% ethanol solution of PVP (polyvinylpyrrolidone K-30, average mol wt 40 000, Matheson, Coleman and Bell). The ethanol is removed by heating to 60° under a stream of dry nitrogen, or, alternatively, by vacuum rotary evaporator. Normal saline (sodium chloride injection, U.S.P., Abbot Laboratories) is then added with thorough mixing to bring the volume to 100 ml.

The resulting milky white dispersion when stored under refrigeration and in the absence of light shows no deterioration or isomerization of the  $\Delta^9$ -THC, as determined by gas chromatographic analysis, over at least two months.

The PVP concentration should be at least 20 times that of the  $\Delta^9$ -THC to produce a homogeneous suspension, thus there is some limitation to the amount of  $\Delta^9$ -THC that can be effectively suspended without raising the viscosity of the medium to impractical levels. Preparations containing 2.5 mg/ml have been administered intravenously to rats without difficulty, and use of these dispersions in infusion pump administration to catheterized animals has been successful.

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