Abietic acid is one of several naturally occurring tricyclic diterpenoid carboxylic acids (resin acids) which are commonly found in the wood and bark of coniferous trees such as firs and pines. They are released into aquatic systems primarily as a result of the operations of the pulp and paper industry. Resin acids can be detected in the brains of fish after exposure (1,2) and the poisoning symptoms described indicate an action on the nervous system (2). Although no detailed toxicological studies involving abietic acid appear to have been carried out in mammals, it is known that its dehydro-derivative is moderately toxic to the rat and that it can impair co-ordination and produce paralysis (3). This paper describes preliminary results on the pre-synaptic actions of abietic acid and forms part of a broader investigation on the potential neuroactive effects of resin acids which to date has focused on dehydroabietic acid and will be published elsewhere.

The present experiments were conducted using mammalian brain. The isolation of synaptosomes, together with measurements of membrane potential, release of neurotransmitter and total ATPase activity were carried out using published procedures (5,6,7 and 8). It can be seen from Figures 1 and 2 that micromolar concentrations of abietic acid depolarise the synaptosomal membrane and cause release of acetylcholine. These responses are not inhibited by tetrodotoxin. Abietic acid caused very weak inhibition of synaptosomal ATPase activity (5.4 % at 100 μM). Under similar conditions of assay the classical Na+/K+ ATPase inhibitor ouabain gave 26.4 % inhibition of total ATPase activity.

This research identifies two actions of abietic acid which may contribute to neurotoxicity, namely membrane depolarisation and release of neurotransmitters. The insensitivity of these responses to tetrodotoxin eliminates the possibility that these effects are mediated through sodium channel activation. Likewise ATPase inhibition does not appear to play an obvious role in initiating synaptosomal depolarisation. The results of this study indicate that abietic acid has a similar pharmacological profile to the dehydro analogue. The possibility that abietic acid is having a direct action on the permeability of the synaptosomal membrane to sodium or potassium ions is currently under investigation.

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**Figure 1.** Effect of abietic acid on membrane potential of synaptosomes and inability of tetrodotoxin (TTX) to influence response (means ± S. E. of 3-5 assays).

**Figure 2.** Stimulation of acetylcholine (ACh) release from nerve terminals by abietic acid and failure of tetrodotoxin (TTX) to affect response (means ± S. E. of 3 assays).