

1 **Abstract:**

2 T-cell acute leukemia and lymphoma have a poor prognosis. Although new therapeutic  
3 agents have been developed, their therapeutic effects are suboptimal.  $\alpha$ -Pinene, a  
4 monoterpene compound, has an antitumor effect on solid tumors; however, few  
5 comprehensive investigations have been conducted on its impact on hematologic  
6 malignancies. This report provides a comprehensive analysis of the potential benefits of using  
7  $\alpha$ -pinene as an antitumor agent for the treatment of T-cell tumors. We found that  $\alpha$ -pinene  
8 inhibited the proliferation of hematological malignancies, especially in T-cell tumor cell lines  
9 EL-4 and Molt-4, induced mitochondrial dysfunction and reactive oxygen species  
10 accumulation, and inhibited NF- $\kappa$ B p65 translocation into the nucleus, leading to robust  
11 apoptosis in EL-4 cells. Collectively, these findings suggest that  $\alpha$ -pinene has potential as a  
12 therapeutic agent for T-cell malignancies, and further investigation is warranted.