



## Application of ATRA as a complementary drug in chemotherapy

M. Amani<sup>a,b</sup>, A. Niapour<sup>c</sup>, N. Najafzade<sup>c</sup>

<sup>a</sup> Department of Medicinal Chemistry, School of Pharmacy, Ardabil University of Medical Sciences, Ardabil, Iran

<sup>b</sup> Department of Biochemistry, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

<sup>c</sup> Research Laboratory for Embryology and Stem Cells, Department of Anatomical Sciences, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

### ABSTRACT

The side effects and drug resistance are two limits in the application of chemotherapeutic drugs. All-trans retinoic acid, ATRA as a natural compound may help to overcome these limitations. To assess this hypothesis, we investigated the efficacy of combined treatment by chemotherapeutic drugs and ATRA on different cancer cell lines and stem cells using different methods including cell viability, cell apoptosis, cell cycle analysis, RT-PCR, and ELISA. Results showed that the combination therapy increases the effectiveness of chemotherapeutic drugs in terms of increasing the expression of the proteins leading to apoptosis and arresting the cells in G1. In conclusion, ATRA has synergistic effects with chemotherapy leading to usage of low dosages of drugs, especially in stem cells. Low doses of drugs in combination with ATRA promise new opportunities in cancer treatment without worrying much about chemotherapy side effects and drug resistance.

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