

## Oestrogenic activity of mimosine on MCF-7 breast cancer cell line through the ER $\alpha$ -mediated pathway

### ABSTRACT

Hormone replacement therapy has been a conventional treatment for postmenopausal symptoms in women. However, it has potential risks of breast and endometrial cancers. The aim of this study was to evaluate the oestrogenicity of a plant-based compound, mimosine, in MCF-7 cells by in silico model. Cell viability and proliferation, ER $\alpha$ -SRC1 coactivator activity and expression of specific ER $\alpha$ -dependent marker TFF1 and PGR genes were evaluated. Binding modes of 17 $\beta$ -oestradiol and mimosine at the ER $\alpha$  ligand binding domain were compared using docking and molecular dynamics simulation experiments followed by binding interaction free energy calculation with molecular mechanics/Poisson-Boltzmann surface area. Mimosine showed increased cellular viability (64,450 cells/ml) at 0.1  $\mu$ M with significant cell proliferation (120.5%) compared to 17 $\beta$ -oestradiol (135.2%). ER antagonist tamoxifen significantly reduced proliferative activity mediated by mimosine (49.9%). Mimosine at 1  $\mu$ M showed the highest ER $\alpha$  binding activity through increased SRC1 recruitment at 186.9%. It expressed TFF1 (11.1-fold at 0.1  $\mu$ M) and PGR (13.9-fold at 0.01  $\mu$ M) genes. ER $\alpha$ -mimosine binding energy was -49.9 kJ/mol, and it interacted with Thr347, Gly521 and His524 of ER $\alpha$ -LBD. The results suggested that mimosine has oestrogenic activity.

**Keyword:** MCF-7 cell line; TFF1 and PGR genes; Mimosine; Oestrogenic activity