Objective: Data are scarce on the direct comparison between the natural estrogen 17beta-estradiol (E2), used for HRT and COC (combined oral contraceptives), and the synthetic estrogen 17alpha-ethinylestradiol (EE), used for COCs, on the proliferation of pre-existing breast cancer cells. In the present experiment we investigated the effect of both estrogens on the expression of apoptotic and proliferative markers in ZR 75-1 cells, a human breast cancer cell line.

Methods: ZR 75-1 cells were incubated with E2 and EE (each 10^-9 M) for five days. Quantitative western blot was used for the following markers: ERK42-p, ERK44-p, proliferating cell nuclear antigen (PCNA) and Bcl2.

Results: The expression of the mitogenic markers ERK42p and ERK44p were strongly enhanced by both estrogens. Interestingly EE had a greater effect on the increase of ERK42p and ERK44p than E2. PCNA was slightly increased by the estrogens. Both E2 and EE enhanced the expression of the anti-apoptotic marker Bcl2.

Conclusions: EE and E2 appear to elicit similar effects on proliferative and apoptotic markers in human breast cancer cells. However, derived from the much lower dosages of EE compared to E2 used in clinical practice, the risk of breast cancer using EE might be lower compared to the use of E2 which already has been suggested from epidemiological evidence.