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Individual and combined effects of estrogen, progesterone, and relaxin on the proliferation of human cervical adenocarcinoma cells in culture

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This study was performed to determine whether individual treatment with estrogen, progesterone, and relaxin alone or in combinations influences the growth of human adenocarcinoma cells of the cervix that has been shown to contain receptors for these steroids and relaxin and proliferate by relaxin. The cells were maintained in DMEM with 5% calf serum. Highly purified porcine relaxin was added at concentrations of 10^{-12} to 10^{-6} M and incubated for 96 hr. Different concentrations (1, 10, 100, and 1,000 ng/ml) of estrogen and/or progesterone were added to each concentration of relaxin. Cell proliferation/cytotoxicity and endogenous nitric oxide production were determined using a colorimetric MTS assay and Griess assay, respectively. The results indicate that relaxin alone or in combination with either estrogen or progesterone at the doses and times of exposure used in this study does not significantly influence the number of viable HeLa cells. However, relaxin at nanomolar concentrations (10^{-9} to 10^{-7} M) promoted to a small extent growth of HeLa in the presence of both estrogen and progesterone. Although treatment of relaxin in combination with estrogen and/or progesterone did not influence significantly on nitric oxide production, there was a trend of decrease in nitric oxide production by relaxin treatment at concentrations from 10^{-9} M to 10^{-7} M in the presence of both steroids. We conclude that relaxin in combination with both estrogen and progesterone may have proliferation effects on the growth of the cervical adenocarcinoma cell in culture.