

The Cytotoxic Effects of Progesterone on HEK cell line in Cell Culture

¹Rahim Ahmadi, ²Sara Eghbalnia*, ³Mojgan Shabani

¹Department of Physiology, Faculty of Basic Sciences, Islamic Azad University, Hamedan Branch,
Hamedan, Iran

²* (Corresponding author) Department of Toxicology, Faculty of , Pharmaceutical Sciences,
Pharmaceutical Sciences Branch, Islamic Azad University, Tehran-Iran (IAUPS)

³Department of Physiology, Faculty of Basic Sciences, Islamic Azad University, Hamedan Branch,
Hamedan, Iran

Abstract: Sex steroids may have cytotoxic effects on normal cells. This study was carried out to determine the effects of progesterone on viability of normal kidney cells (HEK cell line) in cell culture. HEK cells were exposed to 0.0001, 0.001, 0.01, 0.1, and 1 of progesterone solution. MTT assay was used to determine cytotoxic effects of the progesterone. Our results indicated that administration of 0.01 and 0.1 mg/ml of progesterone resulted in significant increase in viability of HEK cells compared to control cells ($P < 0.05$), however, of 1 mg/ml of progesterone resulted in significant decrease compared to control group ($P < 0.001$). Our findings indicated that dprogesteron may increase or decrease viability of normal kidney cells based on dose of hormone used.

Keywords: Progesterone , HEK cell line, Viability

1. Introduction

Progesterone is an endogenous steroid involved in menstrual cycle, pregnancy, and embryogenesis of human[1]. Progesterone is also a crucial metabolic intermediate in the production of other endogenous steroids, including the sex hormones and the corticosteroids, and plays an important role in brain function as a neurosteroidm[2] . Progesterone is used in treatment of perimenopausal symptoms; progesterone insufficiency; endometrial hyperplasia, prophylaxis; amenorrhea; endometriosis [3].

HEK 293 cells were generated in 1973 by transformation of cultures of normal human embryonic kidney cells with sheared adenovirus 5 DNA in Alex van der Eb's laboratory in Leiden, The Netherlands. The human embryonic kidney cells were obtained from a single apparently healthy fetus legally aborted under Dutch law; the identity of the mother and the reason for the abortion are no longer known[4]. HEK 293 cells and other human cell lines generated by adenovirus transformation of human embryonic kidney cells have many properties of immature neurons, suggesting that the adenovirus preferentially transformed a cell in the original kidney culture[5].

Studies show that sex hormones has improving effects on normal human endometrial epithelial cells[6] . Findings also support a short-term strategy for clinical use of sex hormones to enhance the production of some cells and stem cells like HSC (hematopoietic stem cell) engraftment, leading to improved outcomes in adult patients undergoing HSCT and immune depletion in general [7]. Sex hormones also can increase recombinant human factor production by 30-50% HEK clones[8]. Progesterone also has improving effects on postmenopausal women [9]. It has been shown that medroxyprogesterone 17-acetate promotes differentiation in mouse embryonic stem cells [10]. It also promotes proliferation of various cells [11]- [13].

Despite evidences showing protective and proliferative of progesterone on several cells, there are reports indicating that progesterone may have inhibiting role in cellular growth and proliferation [14]-[15]. The main

aim of this study was to determine the effects of progesterone on viability of normal kidney cells (HEK cell line) in cell culture.

2. Materials and Methods

Different doses of progesterone (0.0001, 0.001, 0.01, 0.1, and 1 mg/ml) were used in our study. HEK cells (normal kidney cell line) were purchased from National Cell Bank of Iran (Pasteur Institute, Tehran, Iran). Cells were grown and incubated in standard situation. Then, cells were sub-cultured into 75cm² flasks, 96-well plates or 6-well plates. Cytotoxicity of different doses of the extract was assayed using MTT method. Analyses were conducted using the SPSS 20 and ANOVA.

3. Results

Our results indicated that administration of 0.01 and 0.1 mg/ml of progesterone resulted in significant increase in viability of HEK cells compared to control cells ($P < 0.05$), however, of 1 mg/ml of progesterone resulted in significant decrease compared to control group ($P < 0.001$). Administration of 0.0001 and 0.001 mg/ml of progesterone did not significantly change the viability of HEK cells compared to control cells (Figure I).

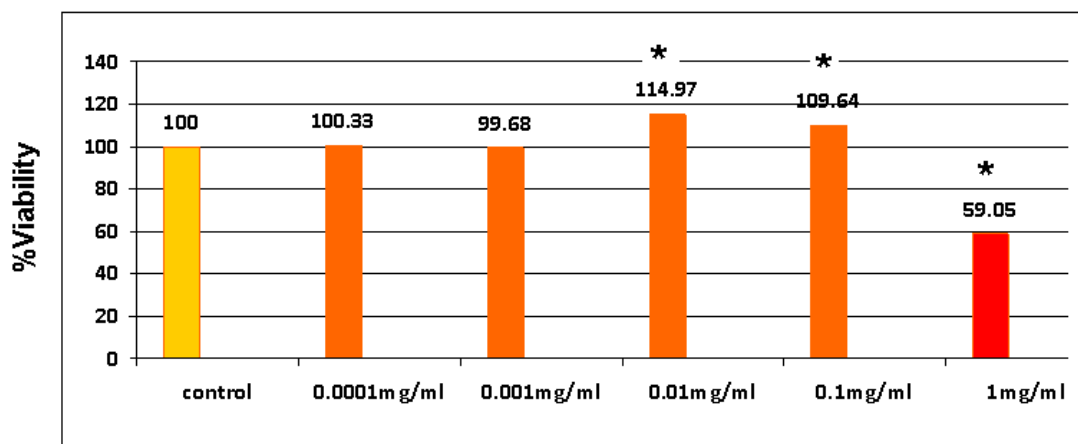


Figure I. Viability of HEK cells compared to control group. * indicates significant difference compared to control group ($P < 0.05$).

4. Discussion

Our study indicated that, the 0.01 and 0.1 mg/ml of progesterone significantly increase viability of HEK cells line in cell cultures ; however, 1 mg/ml of progesterone resulted in significant decrease in cell viability. There are studies reporting the improving effects of progesterone in treatment of some diseases [16]. In line with our finding, previous studies show that low-doses of progesterone has protective effect, however, high-doses of progesterone has moderate toxicity [17],[18]. Also, results of studies show that down regulation of signaling is a key mechanism underlying progesterone inhibition of cancer growth [19]. Mechanistically, it is probable that by several mechanisms including regulation of gene expression by binding to their cognate receptors, activation of intracellular pathways and modulation of receptors progesterone acts on viability [20].

5. Conclusion

According to our finding, different doses of progesterone has different effect on normal kidney cells viability.

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7. References

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