

Cytotoxic Effects of Testosterone on Brain Cancer Cell Line (A172) in Cell Culture

Farahmandlou N, Nooroozi S*, Saberi B, Moulavi P

Abstract— Testosterone have been shown in many studies to have protective role against cancer. The main aim of this study was to assess cytotoxic effects of testosterone on brain cancer cells (A172) in cell culture. A172 cells were exposed to 0.001, 0.01, 0.1, 1 and 10 mg/ml of testosterone solution. MTT assay was used to determine cytotoxic effects of testosterone. Our results indicated that exposure to 0.1, 1 and 10mg/ml of testosterone led to significant decrease in viability compared to control cells ($P<0.05$, $p<0.001$ and $P<0.001$, respectively). According to our finding, high doses of testosterone have cytotoxic effects on brain tumor cells in cell culture.

Index Terms— Testosterone , A172, Viability.

I. INTRODUCTION

Brain tumors are composed of cells that exhibit abnormal growth in the brain. The major areas of the brain have one or more specific functions. They can be benign (noncancerous , meaning that they do not spread elsewhere or invade surrounding tissue) or malignant (cancerous). Cancerous brain tumors are further classified as either primary or secondary tumors [1]. They are very harmful diagnoses and could change the patient lifestyle because of the symptoms that come with brain tumors. Also it can cause personality changes and certain types of body reactions [2]. Anabolic steroids are artificial versions of a hormone that is in all of us - testosterone. These steroids can affect the hypothalamus [3]. Steroid drugs are type of drugs used to relieve swelling and inflammation. Some steroid drugs may also have anti-tumor effects [4]. Although we know that anabolic steroids are bad for the heart, can increase fat deposits in blood vessels and they may also damage the liver [3]. It has been shown that increased levels of testosterone were associated with a 30%-80% increased risk of early death after cancer, but unchanged risk of incident cancer [5]. In this study, we exerted laboratory experimental research to assess cytotoxic effects of testosterone on brain cancer cell line (A172) in cell culture.

II. MATERIAL AND METHODS

Different concentrations (0.001, 0.01, 0.1, 1 and 10mg/ml) of testosterone were prepared and used in our study. A172 cells (brain cancer 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 progesterone was assayed using MTT method. The MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-tetrazolium bromide] assay is a colorimetric assay for assessing cell metabolic activity [6] [7]. MTT a yellow tetrazole, is reduced to purple formazan in living cells [8]. When cells are incubated with MTT, the resulting optical density of the formazan product is dependent upon both the concentration of MTT and the incubation time [9]. MTT assays are usually done in the dark since the MTT reagent is sensitive to light [7]. Analyses were conducted using the SPSS 20 and ANOVA.

III. RESULTS

Our results indicated that exposure to 0.1, 1 and 10mg/ml of testosterone led to significant decrease in viability compared to control cells ($P<0.05$, $p<0.001$ and $P<0.001$, respectively). (Figure I).

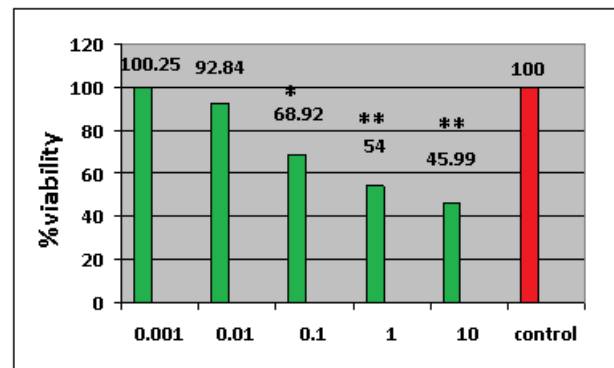


Figure I. Viability of A172 cells compared to control group. *and ** indicates significant difference compared to control group ($P<0.05$ and $P<0.001$, respectively).

IV. DISCUSSION

Testosterone is a physiologically important androgen in both males and females but plays a significant role in the development of reproductive organs in the male. Testosterone acts via the androgen receptor which is a DNA-binding transcription factor which regulates gene expression and protein synthesis and plays a central role in increasing

Nooshin Farahmandlou (PhD) is with Department of Molecular and Cellular Sciences, Faculty of Advanced Sciences & Technology , Pharmaceutical Sciences Branch, Islamic Azad University, Tehran-Iran(IAUPS).

Sanaz Nooroozi *(Corresponding author) is with Department of Genetics, Genetic, Faculty of Basic Science, Islamic Azad University of Tonekabon Branch, Mazandaran, Iran

Behrooz Saberi is with Department of Microbiology, Faculty of Basic Sciences, Islamic Azad University of Tonekabon Branch, Mazandaran, Iran

Pooria Moulavi is with Department of Biotechnology, Faculty of Basic Sciences, Islamic Azad University of North Tehran, Tehran, Iran

intracellular protein levels. As a result of androgen signaling, tissues proliferate and both basal metabolic demand and energy consumption increase [10].

Testosterone is a medication and naturally occurring steroid hormone. It is used to treat male hypogonadism and certain types of breast cancer [11]. In a study, the protective role of testosterone-repressed prostate message-2 (TRPM-2) has shown that is highly up-regulated in several tissues undergoing apoptosis, including normal prostate, and prostate and breast cancer xenograft models after hormone withdrawal. [12]. Testosterone has also been shown to decrease neuron differentiation in rat embryos. This action is mediated by the androgen receptor (AR), which is expressed in large numbers by rat neuron cells; nonetheless, such findings have not yet been reported in humans [13]. It has also been demonstrated that testosterone may promote early colonic adenomagenesis in rats [14].

V. CONCLUSION

According to our finding, high doses of testosterone have cytotoxic effects on brain tumor cells in cell culture.

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