

Incidence of Seminoma Cancer in Staffs that Worked in Electromagnetic Waves Station; Three Cases Report

Mohammad Houshyari¹, Anya Jafari¹, Ahmad Mostaar²

Abstract

Physical agents such as ultraviolet or ionizing radiation and repetitive trauma have been related to the causation of cancer in humans. Much less clear is the association between exposure to radiofrequency, such as radar and microwave radiation to the development of cancer. Sporadic case reports and small series suggest that this type of radiation might lead to cancer or contribute to its evolution. The association between radiofrequency and testicular damage and cancer is unproved, but clinical and experimental data are suggestive of such possibility. In this paper we have reported three cases of seminoma in person who worked in the same place that exposed to radio frequency (RF) waves.

Keywords: Seminoma cancer; Radiofrequency; Electromagnetic waves

Please cite this article as: Houshyari M, Jafari A, Mostaar A. Incidence of Seminoma Cancer in Staffs that Worked in Electromagnetic Waves Station; Three Cases Report. *Iran J Cancer Prev.* 2015;8(1):66-8.

Introduction

Testicular cancer is the most common malignancy among young men in North America and western European countries [1]. More than 95% of testicular cancer are germ cell tumors either seminoma or nonseminoma. There are several proposed risk factors for seminoma such as cryptorchidism, klinefelter syndrome, radiofrequency waves and etc. But controversy exists concerning the health risks from exposures to radiofrequency/microwave irradiation [2]. Sporadic case reports and small series suggest that this type of radiation might lead to cancer or contribute to its evolution. The association between radiofrequency and testicular damage and cancer is unproved, but clinical and experimental data are suggestive of such possibility [3]. There are some case series and case reports about this but this relation is not proved. In this paper we have reported three cases of seminoma in person who worked in the same place that exposed to radio frequency (RF) waves.

Case Report

The first case

He was a 31-year-old man who has worked in a radio station for 6 years while he was left that place 10 years before diagnosis of seminoma. Initial evaluation revealed stage 1 seminoma and he was

underwent radiotherapy after radical orchiectomy and his disease free until now.

The second case

He was a 37-year-old man with seminoma diagnosis after radical orchiectomy on his 25 years after 6 years work in the same place. Because of stage 1 disease he received radiotherapy and it made him disease free until now.

The third case

He was a testicular cancer with the same pathology, seminoma, but with inguinal metastasis. He was worked in that place for 16 years and was diagnosed for seminoma at the last one year of his job. After radical orchiectomy radiotherapy is done his response was good and he is under follow up now.

Their workplace was a radio station that consist multiple receiver and transmitter antennas and the frequency of waves were in the radiofrequency spectrum. It seems in this station some parasite transmitter for satellite wave have been worked. One of these antennas has about 400 meter height. The staffs worked there for 24 hours, however in their resting time for 48 hours were in that enclosure too. So they didn't free of exposure.

1. Dept. of Radiation Oncology, Shohada Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

2. Dept. of Medical Physics, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author:

Mohammad Houshyari, MD;

Radiation Oncologist

Tel: (+98) 9123890621

Email: dr.mhoushyari@gmail.com

Received: 26 Jan. 2015

Accepted: 26 Jan. 2015

Iran J Cancer Prev. 2015; 1:66-8

Discussion

Rapid technological progress led to increase man-made sources for radiofrequency that some of these sources are mobile communication, microwave oven, Wi-Fi, television, antenna, detection equipment or radio stations. Radiofrequency (RF) radiation is at the low-energy end of the electromagnetic spectrum and is a type of radiation that has enough energy to move atoms or cause them to vibrate but not enough to ionize them so called non-ionizing radiation. Although RF radiation does not cause cancer by ionizing and damaging DNA in cells, there has been concern that some forms of non-ionizing radiation might have biological effects that could result in cancer in some circumstances.

Increased incidence of cancer in the past decades made specialist to pay attention to some environmental risk factors and one of probable risks is radiofrequency exposure. Sporadic case reports and small series suggest that this type of radiation might lead to cancer or contribute to its evolution. But the association between cancer and radiofrequency is still unproved and there are some controversies. Most of exist studies are about the radiofrequency and brain tumor, however seminoma report just in some series.

Marjanović et al. has evaluated the biological effect of radiofrequency in vivo, they found that reactive oxygen species concentration increased within the cell caused by RF/MW radiation seems to be a biologically relevant hypothesis to give clear insight into the RF/MW action at non-thermal level of radiation [4]. In a population-based case-control study, Baumgardt-Elms et al. has examined the association of testicular cancer and electromagnetic fields (EMF) in the workplace by standardized face to face interviews in case (n=269) and control (n=797) groups. They concluded environmental EMF exposure in the workplace does not seem to be a relevant risk factor for testicular cancer as a result of their study [5].

Goldsmith et al. has reported the result of a study about all of previous publication about microwave exposure and radiofrequency effects. Possible outcomes considered included blood count changes, evidence of somatic mutation, impairment of reproductive outcomes, especially spontaneous abortion, and increase in cancer incidence. The author presented evidence that sufficient microwave exposures are associated with all four of mentioned outcomes, concluding that the possible effects and

their timings with respect to exposure are qualitatively similar to those on ionizing radiation [6]. Hayes et al. has investigated the association between occupation and testicular cancer risk, self-reported exposure to microwaves and other such waves was associated with an increased risk for both seminomas and other germinal cell tumors. However, an assessment of radio wave exposure based on job title did not support this finding [7].

Richter et al. has described results of a case-control study exposure-effect relationship in sentinel patients and their co-workers, who were technicians with high levels of exposure to RF/MW radiation. Their calculations derived from a linear model of dose-response suggest the need to prevent exposures in the range of 10-100 $\mu\text{w}/\text{cm}^2$ [8]. Occupational exposure to extremely low-frequency magnetic fields (MF) was studied by Stenlund et al., in 144 subjects with testicular cancer, germ cell tumor, diagnosed in 1985-87. The results for testicular cancer gave some support to the hypothesis of abnormal link between MFs and cancer, and should be further explored [9].

Studies about carcinogenic effect of radiofrequency waves and the mechanism of that are limited, and most of them are case series or case control retrospective studies, it seems that we need more in vivo surveys and prospective studies to evaluate this effect.

Acknowledgment

None declared.

Conflict of Interest

There was not any kind conflict of interest regarding this study.

References

1. Edward C. Halperin, Luther W. Brady, Carlos A. Perez and David E. Wazer. Perez & Brady's Principles and Practice of Radiation Oncology. 2013; Six edition.
2. Richter E, Berman T, Ben-Michael E, Laster R, Westin JB. Cancer in radar technicians exposed to adiofrequency/microwave radiation: sentinel episodes. *Int J Occup Environ Health*. 2000;6(3):187-93.
3. Merimsky O, Levita M, Merimsky E, Chaitchik S. Radiofrequency and testicular cancer (review). *Oncol Rep*. 1996;3(2):365-8.
4. Marjanović AM, Pavičić I, Trošić I. Biological indicators in response to radiofrequency/ microwave exposure. *Arh Hig Rada Toksikol*. 2012;63(3):407-16.

5. Baumgardt-Elms C, Ahrens W, Bromen K, Boikat U, Stang A, Jahn I, Stegmaier C, Jöckel KH. Testicular cancer and electromagnetic fields (EMF) in the workplace: results of a population-based case-control study in Germany. *Cancer Causes Control*. 2002;13(10):895-902.

6. Goldsmith JR. Epidemiologic Evidence of Radiofrequency Radiation (Microwave) Effects on Health in Military, Broadcasting, and Occupational Studies. *Int J Occup Environ Health*. 1995;1(1):47-57.

7. Hayes RB, Brown LM, Pottern LM, Gomez M, Kardaun JW, Hoover RN, O'Connell KJ, Sutzman RE,

Javadpour N. Occupation and risk for testicular cancer: a case-control study. *Int J Epidemiol*. 1990;19(4):825-31.

8. Richter E, Berman T, Ben-Michael E, Laster R, Westin JB. Cancer in radartechnicians exposed to radiofrequency/microwave radiation: sentinel episodes. *Int J Occup Environ Health*. 2000;6(3):187-93.

9. Stenlund C, Floderus B. Occupational exposure to magnetic fields in relation to male breast cancer and testicular cancer: a Swedish case-control study. *Cancer Causes & Control*. 1997;8(2):184-91.