AWARENESS ABOUT SATURABLE REPAIR MODEL AMONG ALLIED HEALTH SCIENCE STUDENTS

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Abstract

Introduction: The quantification of the effects of radiation on cell growth and the prediction of the percentage of survival of cells for a given dose have received extensive attention over recent decades. The knowledge of this cellular response is the key to the determination of the influence of a dose, or a variation in the dose rate, in a normal radiotherapy treatment. A model can be used to predict survival levels as a function of the total absorbed dose, independently from the number of fractions that are performed during the treatment. **Aim:** This survey was conducted for assessing the awareness about Saturated repair model among Allied Health Science students. **Materials and Method:** A cross-section research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health Science students. The questionnaire assessed Saturated repair model among Allied Health Science Students. The responses were recorded and analysed. **Results:** 82.4 % of the respondents were aware about saturated repair model. 70.6 % were aware of types about repair due to radiation. 54.9 % were aware about the pathway of radiation repair. 54.5 % of the respondents were aware that the repair model. 55.9% were aware about the Misrepair. **Conclusion:** There is a moderate awareness amongst Allied Health Science students about Saturated repair model. Enhanced awareness initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness of Saturated repair model among Allied Health Science Students.

Keywords: Awareness, Students, Repair, Radiation.

INTRODUCTION

The most prominent models of radiation action currently used to describe cell survival can be divided into three main classes, depending on the mechanism hypothesized for producing the shoulder on the survival curve: lesion interaction, multitarget mechanism, or repair saturation[1].

Models that hypothesize lesion interactions are the theory of dual radiation action, the molecular theory), the accumulation model , the repair-misrepair (RMR) model and the lethal-potentially lethal (LPL). All of them assume that lesions can interact in some way to form other lesions, which then prove lethal to the cell[2]. Models of the multitarget mechanism and use the hypothesis of the existence of a succession of cellular targets that are inactivated by the absorbed dose. A different philosophy is developed in the

so-called "repair models". In these models the hypothesis of the existence of a mechanism that is able to repair the damage produced by the radiation in the cells is assumed, e.g., the existence of a pool of chemical compounds which can protect the target molecules, perhaps by hydrogen donation to the free radicals produced by the radiation on the target molecules[3].

By increasing the dose this pool is depleted and the cell is more radiosensitive [repair saturation mechanism]. A concrete example of a repair saturation model is that developed by Haynes. This model postulates that Ln(S), the fraction of cells surviving after irradiation, is proportional to the expected number of unrepaired defects per cell[4]. That is to say, the number of defects removed by repair minus the number of defects produced initially by the radiation,

$$-Ln(S) = F(D) - R(D), \qquad (1)$$

where the term F(D) describes the way in which the potentially lethal DNA defects increase with dose and R(D) indicates the balance between repair and destruction (number of defects removed by repair). By proposing a repair saturation mechanism, Haynes arrives at the expression

$$-Ln(S) = kD - a(- \exp(-3OD)), \qquad (2)$$

where D is the dose and the parameters k, a, and 3 characterize, respectively, the intrinsic inactivation probability per unit dose, the maximum number of potentially lethal hits which can be repaired, and the manner in which repair is saturated when dose increases[5].

MATERIALS AND METHOD

This cross-sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health science students. The students were randomly selected across various disciplines of Allied Health Sciences. The study setting was designated in the university campus. The survey instrument was a questionnaire pre tested and evaluated for validity and reliability concerns.

The questionnaire included ten questions eliciting the demographic data through open ended responses and multiple choice questions for the other responses. The study was approved by the Institutional Ethical Committee and informed consent was obtained from the participants. The questionnaire was posted on an online platform and the identity of the respondents were kept confidential.

The questionnaire assessed the Awareness about Saturated repair model among Allied Health Science Students. The responses were recorded and analyzed. There were no incomplete responses and no dropouts from the study. The final data obtained was organized, tabulated and subjected to statistical analysis.

The salient questions in the study are:

1) Are you aware of saturated repair model?

2) Are you aware of repair due to radiation?

3) Which of the following is a pathway of radiation repair?

4) Which of the following is a repair model?

5) Misrepair leads to?

RESULTS

82.4 % of the respondents were aware about saturated repair model (Figure 1). 70.6 % were aware of types about repair due to radiation(Figure 2). 54.9 % were aware about the pathway of radiation repair(Figure 3). 54.5 % of the respondents were aware that the repair model(Figure 4). 55.9% were aware about the Misrepair(Figure 5).
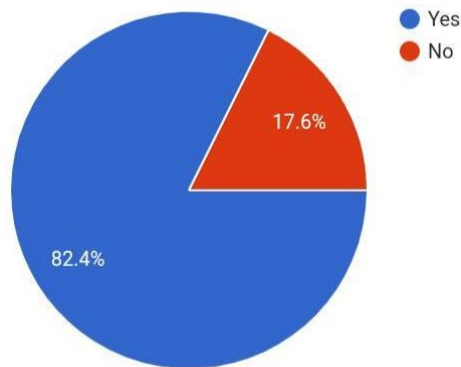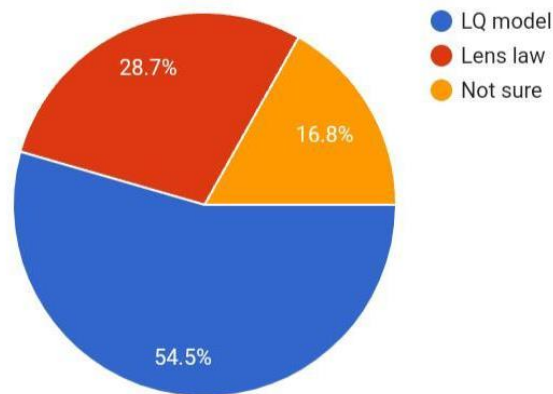

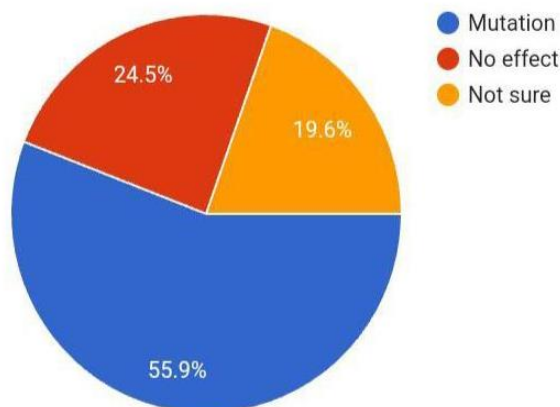**Fig 1: Aware of saturated repair model**
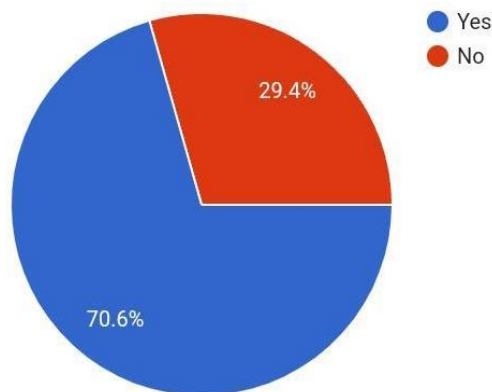
Fig 2: Awareness about the repair due to radiation
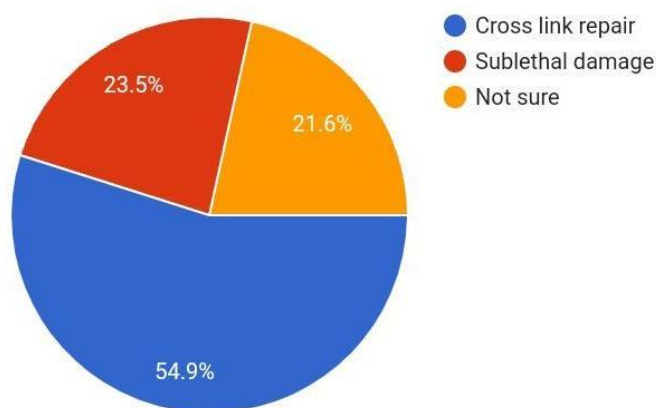
Fig 3: Awareness about the pathway of radiation repair.

Fig 4: Awareness about the repair model

Fig 5: Awareness about the Misrepair

DISCUSSION

Radiation produces different kinds of physical and chemical changes in the cell, e.g., water radicals and other chemical lesions which can react with molecules in the cell, creating biological lesions. These lesions lead to the cell's death. A cell is considered dead when it has not been able to recover from the radiation exposure after a period much longer than the recovery period[6].

If a cellular zone is touched, the cell evolves to a sublethal or damaged state that can lead to its death. Diverse experimental work shows that there are a number of good reasons for DNA to be the principal target[7].

Repair is to be used only for processes which can be defined at the molecular level and for which the mechanism of damage removal can be identified or at least inferred, e.g., photoreactivation, excision, postreplication repair, mismatch repair, SOS repair, and strand break repair. If only cellular properties or function are changed, e.g., survival, the term recovery is to be preferred[8].

The mechanisms of repair and recovery are affected by the radiation (inactivation of repair enzymes), and repair and recovery are less probable as the dose administered to the cell increases.It will be assumed that cellular recovery from the sub lethal state to the normal state is not instantaneous. but that there exists an average recovery period[9,10].

CONCLUSION

There is a good awareness amongst Allied Health Science students about Saturated repair model. Enhanced awareness initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness of Saturated repair model among Allied Health Science Students.

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