

## AWARENESS ABOUT RADIOSENSITIVITY AMONG ALLIED HEALTH SCIENCE STUDENTS

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DOI: [10.5281/zenodo.12073531](https://doi.org/10.5281/zenodo.12073531)

### Abstract

**Introduction:** Radio sensitivity is the relative susceptibility of cells tissues, organs or organisms to the harmful effect of ionizing radiation. Radio sensitivity of cells differ depending on the phase of the cell cycle this is referred to as a cell cycle dependence of radio sensitivity. The variations in radiosensitivity as a function of cells age was qualitatively similar for Neutrons and x rays, that is with both types of radiation, maximum sensitivity is noted at or close to Mitosis, and maximum resistance is evident late in S phase. **Aim:** This survey was conducted for assessing the awareness about Radiosensitivity among allied health science students. **Materials and Methods:** This cross-sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health science students. The questionnaire assessed Awareness about Radiosensitivity among Allied Health Science Students. The responses were recorded and analysed. **Results:** 95.7% of the respondents were aware know radiosensitivity. 93% of the respondents were know of digestive tract is the most radiosensitive organ. 84.3% of the respondents were know of most radiosensitive cells. 91.3% of respondents were know of cell cycle position a factor that affects radiosensitivity. 92.2% of the respondents were know of radiosensitive tumours are the tumours which respond well to radiotherapy. **Conclusion:** There is a very good awareness amongst Allied Health Science students about radiosensitivity. Enhanced aware initiatives and educational programs together with increased importance for curriculum improvements that further promote knowledge and awareness of radiosensitivity among the students.

**Keywords:** Radiosensitivity, X Rays, Radiotherapy, Cell Cycle, Neutrons, Resistant.

### INTRODUCTION

Radio sensitivity is the relative susceptibility of cells tissues, organs or organisms to the harmful effect of ionizing radiation. Radio sensitivity of cells differ depending on the phase of the cell cycle this is referred to as a cell cycle dependence of radio sensitivity. Cells are most sensitive at or close to mitosis. Resistance is usually greatest in the latter, part of S phase. IF Gi phase has an appreciable length, a resistant period is evident early in Gi followed by a sensitive period to ward the end of Gi. G2 phase is usually sensitive, perhaps as sensitive as M phase.[1]

It was found that the variations in radiosensitivity as a function of cells age was qualitatively similar for Nuertrons and x rays, that is with both types of radiation, maximum sensitivity is noted at or close to Mitosis, and maximum resistance is evident late in S phase. There, however, Quantitative differences between neutrons and x rays

in this respect, as in every other. The range of radiosensitivity between the most resistant and the most sensitive phases of the cell cycle is much less for fast neutrons than for x rays. Although the variation of sensitivity with cell age is reduced in neutrons compared with x rays.[2]

It is still very evident and cannot by any means be ignored. The reasons for the sensitivity changes through the cell cycle are not at all understood several have been proposed, of which two are mentioned here, first if DNA is the primary target for radiation induced cell, as commonly is supposed, then changes in the amount or form of the DNA might be expected to result. In variations in sensitivity the fastest cycling mammalian cells in culture, and crypts in the intestinal epithelium, have cycle times as short as 9 to 10 hours.[3]

Stem cells in resting mouse skin may have cycle times of more than 200 hours. Most of this difference results from the varying length of G<sub>1</sub>, the most variable phase of the cycle. M and S phase do not vary much. The pattern of resistance and sensitivity correlation with the level of sulfhydryl compounds in the cell. Sulfhydryls are natural radioprotectors and tend to be at their lowest near mitosis. Variations in sensitivity through the cell cycle may be important in radiation therapy because they lead to sensitization resulting from re-arrangement in a fractionated regimen. Sore skin, in some people, radiotherapy can make the skin and red, darken than normal or dry and itchy, tiredness, hair loss, feeling sick, problems eating and drinking, diarrhea, stiff joints and muscles.[4,5] This survey was conducted for assessing the awareness about radiosensitivity among allied health science students.

## **MATERIALS AND METHODS**

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 in an online platform and the identity of the respondents were kept confidential.

The questionnaire assessed the awareness about radiosensitivity. The responses were recorded and analysed. 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) Do you know what is Radiosensitivity?
- 2) Do you know that the digestive tract is the most radiosensitive organ?
- 3) Which of these are the most radiosensitive cells?
- 4) Is cell cycle position a factor that affects radiosensitivity?
- 5) Radiosensitive tumours are tumours which respond well to radiotherapy?

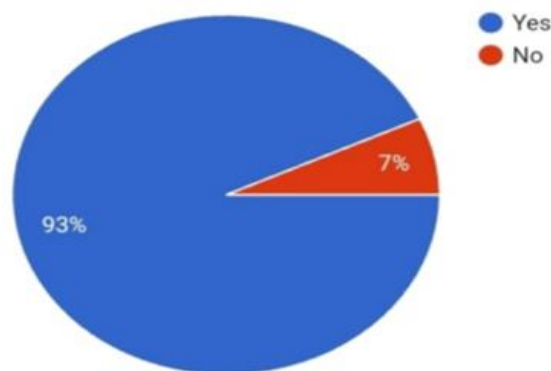
## RESULTS

95.7% of the respondents were aware of radiosensitivity (Figure 1). 93% of the respondents were know of digestive tract is the most radiosensitive organ(Figure 2). 84.3% of the respondents were know of most radiosensitive cells(Figure 3). 91.3% of respondents were know of cell cycle position a factor that affects radiosensitivity(Figure 4).92.2% of the respondents were know of radiosensitive tumours are the tumours which respond well to radiotherapy (Figure 5).

**Figure 1: Awareness of radiosensitivity**

2.Do you know that the digestive tract is the most radiosensitive organ?

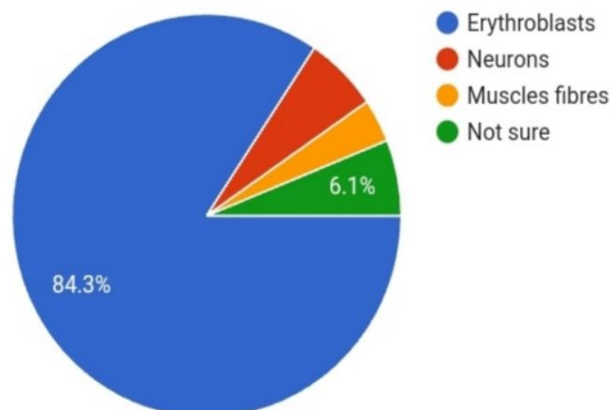
115 responses



**Figure 2 : Awareness of most radiosensitive organ**

3.Which of these are the most radiosensitive cells?

115 responses



**Figure 3**

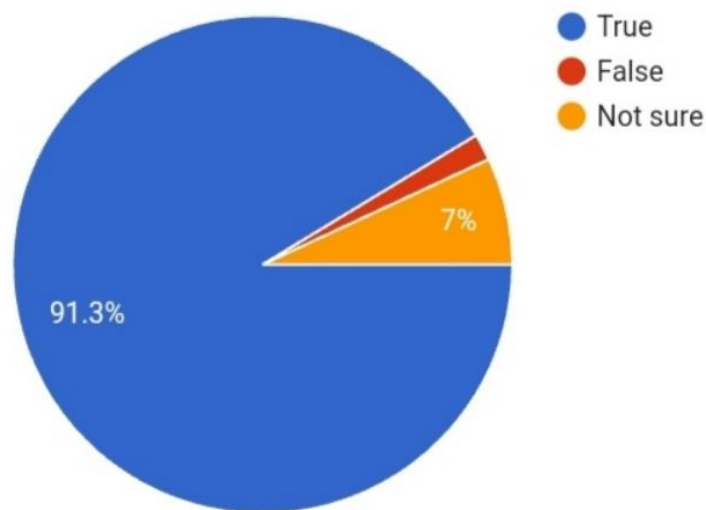


Figure 4

5. Are Radiosensitive tumours are the tumours which respond well to radiotherapy

115 responses

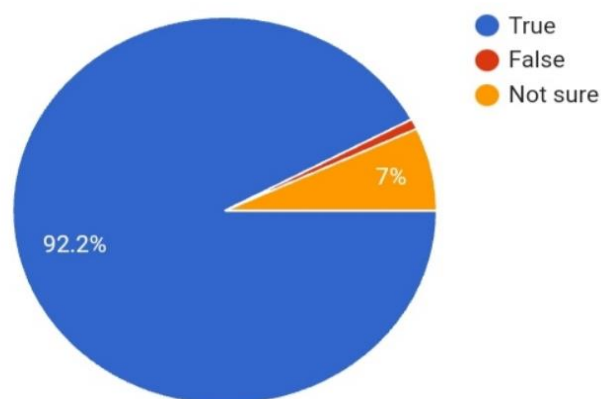


Figure 5

## DISCUSSION

Ionizing radiation has often been described as a double-edged sword for human health. It can control cancer in radiotherapy, yet it can also induce the potential detrimental health effects associated with secondary cancers as side effects. Hence, controlling tumor cells and minimizing radiation effects on nearby normal tissues are two major goals of radiotherapy. In pursuit of these objectives, cellular radiosensitivity can provide important insights into identifying the different responses of tumor and normal tissues in radiotherapy, as well as screening individuals (like astronauts) to

elect suitable candidates for long-term working in a space radiation environment. In the study the students have good awareness about Radiosensitivity.[6]

Charged-particle therapy has many advantages over the common methodology due to the characteristics of their particular physical and radiobiological properties, including giving rise to a sharp maximum in ionization near the end of the range (Bragg peak) and enhanced relative biology effectiveness (RBE) [7]. RBE is defined as the ratio of the dose of a reference radiation (usually assumed to be X-rays or  $\gamma$ -rays) to the radiation under study that will produce an equal level of effect for a given experimental observation. The students were aware about the most radiosensitive organ.[8]

In fact, the complex RBE depends not only on the dose levels, but also on other factors, including the radiation qualities (such as the dose rate, the type and linear energy transfer (LET) of the radiation particles, etc.) and the biological characteristics (such as species, stage of development, and the endpoint under consideration, etc.). [9]The awareness about Radiosensitivity based on Cell cycle position is also fair among the AHS students.

An accurate RBE is critical for a given treatment plan in radiotherapy, determining the radiation weighting factor in the radiological protection, and estimating the radiation quality factor for space radiation risk assessment in interplanetary missions. In addition, RBE can also be used to reflect the radiosensitivity of lymphoid and germinal tissues, which is very different from inherent cellular radiosensitivity. The students are aware that Radiosensitive tumors respond well to Radiotherapy.[10]

As distinct from the radiosensitivity, RBE is likely to be similar for the various epithelial and mesenchymal tissues in the treatment volume; the differences between the particular RBE values would not clinically significant. Based on these considerations, it is very important to determine both RBE and individual radiosensitivity as accurately as possible in radiotherapy.[11]

## CONCLUSION

There is a very good awareness amongst Allied Health Science students about radiosensitivity. Enhanced aware initiatives and educational programs together with increased importance for curriculum improvements that further promote knowledge and awareness of radiosensitivity among the students.

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