Medical Linear Accelerator

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***Abstract*—The Linear Accelerator has allowed more people to be treated for cancer and has allowed for more highly concentrated doses to help battle it more effectively.**

I. Introduction

The Medical Linear Accelerator was created 56 years ago as a new way to battle cancer. With over 12 million people with cancer, having new more sensitive equipment means that more people can be treated and possibly cured of the disease. There are many problems associated with the treatment of cancer, such as the amount of radiation needed to be used in order cure it, and the effect of radiation on the healthy cells in the body.

II. Linear Accelerator

A linear accelerator is a particle accelerator. The machine increases the energies of electronically charged particles within a part of the machine called the 'wave guild'. The particles then hit a heavy metal, that creates a high energy x-ray. Before the ray leaves the machine, it is customized to the patients tumor by blocks placed in the head of the machine. In order to direct the electronically charged beam of particles, it uses very strong magnets. However, due to the fact that cancers and lesions do not stay in the same exact place between periods, some linear accelerators, such as the Varian IX, are image guided, meaning that before the beam is used the machine uses x-ray or CAT scan imaging to find the cancer. Only after this does it use the beam to fight the cancer. This works because cancer cells are significantly more sensitive to radiation than normal cells. As a result cancer cells are more likely to be effected by radiation than regular cells.

III. Results

Due to the fact that this machine can pinpoint where a tumor is and provide appropriate care for the affected area, the machine allows for more people to be treated for any type of cancer. Because the newest machines of this kind use CAT and/or x-ray scans right before use, the machines are pinpoint accurate, and can attack the affected area with higher doses of radiation than other machines.

IV. Discussion

Although the machine is medically beneficial in many ways, there have been documented cases of accidents occurring that result in death or injury of the patient. In one report, stated that within an eight-year period, six patients died from a fault in a THERAC-25, a specific Linear Accelerator. The fault was due to program errors that overdosed the patients on radiation, causing more complications followed by death. Even though the article stated that this was only for one of the machines, it could very well happen in any machine. Although the machine has had problems in the past, biomedical engineers have fixed all known problems with it. Thus, Linear Accelerators are still used today because of how helpful it is in fighting cancer.

V. Conclusion

Medical Linear Accelerators have advanced since their creation fifty-six years ago. Now, with the remarkable ability of CAT/x-ray scanning technologies right before the use of radiation, the machine is able to pinpoint the exact location of the tumor/lesion and irradiate it with more radiation than past machines. Medical Liner Accelerators are still being used today, and continue to help patients in need.

References

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