UNIT-1

NON-IONIZING RADIATION

1.4 ARTIFICIAL INTELLIGENCE (AI)

Artificial intelligence (AI) has already been implemented widely in the medical field in the recent years

The idea of artificial intelligence (AI) is believed to be generated from the idea of robots. The idea becomes more and more prominent with more use of biosynthetic machines used in labour. AI can be defined as capability of a machine of imitating human intelligence. AI can be classified into two branches based on its application: virtual and physical. Physical component can be represented in medical devices, sophisticated robots (care bots) and limited mobility helper bots. The virtual component can be represented in machine learning.

Machine learning is a mathematical algorithm that learns through experience. For a physician, the two most important factors for patient care are knowledge and experience. Humans are limited in terms of learning by gathering large amount of data primarily due to time constraints. In the process of human learning, knowledge and experience are both required and gained along a lifetime career. Computer can use algorithms to gain far more experience and store data in significantly shorter amount of time than human

Nowadays, patients demand faster and more personalized patient care, which require physicians to interpret large amount of data and analyse it in a short period of time. Machine learning can aid in these situations by taking data analysis from the physician and provide more efficient, convenient and personalized clinical practice in a shorter time. Massive amount of data is now available to train algorithms and modern computational hardware.

These algorithms are being applied in many fields, such as drug discovery, medical diagnostics and imaging, remote patient care, risk management, hospital assistants and virtual assistance. Components that require a large amount of data analysis, such as DNA and RNA are expected to greatly benefit from these computational algorithms. With the introduction of deep learning algorithm, the machine learning capabilities have

advanced significantly in the recent years.

Radiotherapy process is the process where the radiation dose is delivered to the patient. Dose is energy deposited per unit mass. The main goal of the radiotherapy process is to kill tumour cells using ionizing radiation while sparing or minimizing the energy deposition to healthy cells as much as possible. There are many radiotherapy modalities available now, such as stereotactic body radiotherapy (SBRT), volumetic modulated arc therapy (VMAT), IMRT, proton therapy, electron therapy and brachytherapy. After the treatment plan is created, the plan dosimetry will be verified by a patient specific quality assurance program to ensure an acceptable dose delivery accuracy. When the radiotherapy is performed, the patient is followed for a period of time (months to years) to observe side effects and outcomes.