UNIVERSITI TEKNOLOGI MARA

NUCLEAR MEDICINE DEPARTMENT OF NATIONAL CANCER INSTITUTE – 3 YEARS IN SERVICE : OVERVIEW OF THERAPEUTIC RADIOPHARMACEUTICAL PREPARATIONS

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ABSTRACT

Introduction : Radionuclide therapy is one of radiopharmaceutical modalities to improve the lack of specificity seen in many of the primary classes of anticancer and cytotoxic agents in current medical practice. Radionuclide therapy is developed to selectively deliver the ionizing radiation; specifically alpha and beta particles to kill cancer cells with minimal toxicity to surrounding normal tissues.

Aim : This study aims to understand the progress and the usage of therapeutic radionuclide preparations over 3 years of its operation in Nuclear Medicine Department at the National Cancer Institute.

Objectives : (a) To identify the commonly used therapeutic radionuclide preparations at National Cancer Institute and its trend of use from 2014 to 2016 ; (b) To determine the number of patient benefited from radionuclide therapy at IKN from 2014 to 2016

Methodology : The study is a retrospective audit-based data collection from Nuclear Medicine Department of National Cancer Institute. The data were collected within the 3 years of time range (2014 to 2016).

Results : The percentage of radioiodine preparation (^{131}I) shows a significant usage for therapy (76%) compared to diagnostic purpose (24%). The number of supplied preparation (^{131}I) for thyrotoxicosis therapy shows a slight increment by 20.3% and 28.9% in year 2015 and 2016 respectively. The number of supplied preparation (^{131}I) for ablation therapy shows a mere 4.6% decrease in 2015 from 2014 and a slight increase in 2016 by 18.5%. A clear downward trend followed by a slight upward trend can be seen from 2014 to 2016 for ^{131}I-MIBG preparation. The preparation of ^{90}Y has only started in 2015 and it does not mark a significant number of its usage.

Conclusion : The common radionuclides used for therapy in IKN since 2014 are ^{131}I, ^{131}I- MIBG and ^{90}Y, however, ^{131}I-MIBG is used for diagnostic purpose in National Cancer Institute. The trend of use for all three radionuclides are vary due to the treatment cost, adverse effects of the treatments, patients' factors, limited availability of radionuclides and trained personnel.

CHAPTER ONE

INTRODUCTION

1.1 Background

In the early of 1900s, Henri Becquerel and Marie Curie had discovered the radioactivity effects after Becquerel experienced severe inflammation of his skin after placing a tube of radium in his waistcoat pocket for several hours. This was then led to the discovery of biological importance from radiation[1]. In 1903, Alexander Graham Bell suggested placing sources containing radium in or near the tumors and soon after the experiments were carried out, Frederick Proescher published the first study on the intravenous injection of radium for therapy of various types of diseases[2].

Radionuclide is an unstable atom that has excess nuclear energy, which degenerates to a stable atom by emitting ionizing radiation gamma (γ) or alpha (α) and beta (β) particles from its nucleus. Targeted radionuclide therapy (TRNT) is a radiopharmaceutical technique to selectively deliver radiation to cancer cells or diseased tissue with minimal toxicity to surrounding normal tissues. This targeted therapy has been one of the new