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CONTRIBUTION OF CHEMICAL ENGINEERING IN THE HEALTHCARE FIELD

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Abstract: Recently, chemical engineering has presented an active contribution in the various fields of medicine. Where the community of chemical engineers participated in the development of the use of biocompatible materials, which had a significant impact on the renaissance of modern medicine.

Key words: Medicine, Chemical Engineering.

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1. INTRODUCTION

Medicine has developed melodramatically in recent times, where evolution has been in every possible field. Usually, doctors, nurses as well as pharmacists are highlighted with the exception of chemical engineers, who, of course, are not present in hospitals despite their participation in such achievements [1, 2]. However, chemical engineers have adopted many improvements to life in general and to the medical sector in particular. This is evidenced by their help in the diagnosis treatment of some diseases as well as the development of pharmaceutical

industries that reduce the pain of patients [3].

2. STUDY MOTIVATION

This section is organized in two major parts. The first part is describing the biocompatible materials which play a significant role of chemical engineering in in medicine in general and novel devices in particular. The second part addresses the details of the contribution of the chemical engineer in calibrating instruments in medical laboratories.

2.1 CONTRIBUTION IN BIOCOMPATIBLE MATERIALS

Modern medical devices as well

as prostheses (artificial limbs) consist of more than one substance so it is not fair to talk about the term "biocompatible materials" for just one substance. The process of developing these materials is not an easy process at all, since these substances must be non-toxic as they are present within the human body [4]. These materials should also be unbreakable and last for a long time.

Finding such materials is difficult, but the most difficult task for chemical engineers is to convert these materials into devices that can be attached to the patient or implanted in the patient's body. However, using these biocompatible materials, the pharmaceutical industry can give a great opportunity to heal many diseases. Not only this, using these substances, specific additives can be implemented in the medical field such as:

I. Utilize of vascular transplantation in order to heal and support deteriorated arteries and veins.

II. Invention of cardiovascular implant equipments.

III. Utilize of stents to support arterial tissue.

IV. Invention of many artificial organs such as knees and hips [5].

The aforementioned points gave a second chance for patients who were legless to walk again. In addition, these biocompatible materials have given patients who used to go for renal dialysis two or three times weekly, each time stay for at least four hours to finally rest and enjoy life. In fact, chemical

engineers help patients to live better and healthier lives [6].

2.2 CONTRIBUTION IN MEDICAL LABS

Chemical engineers can contribute to many tasks related to medical laboratories such as projects involve tissue culture or characterization of biological systems. Having considered the aforementioned tasks of a chemical engineer, then, it is important to clarify that a chemical engineer can also contribute to the development of analytical instruments. An equally significant aspect to tasks assigned to the chemical engineer which is the leadership of chemical analysis laboratory. Indeed, chemical analysis laboratories are defined as labs that transact with the placement of narcotics, blood analysis such as lipid profile.

Chemical engineers keep playing a key role in the design and improvement of complicated, innovative equipments to heal human ailments. In fact, there are a lot of the restrictions actually being classified in this potential area comprise the invention of very small equipments utilized to reinforce medical prognosis and therapy. The task of chemical engineers in the perception of the contests in protein structure has been addressed in different novel publications [7-10].

The chemical engineer plays a potential approach in the calibration process of any lab device inside a hospital. In particular, the role is focused on estimating and setting the

precision and accuracy of measurement equipment. Thus, perfect calibration of equipment permits technicians to obtain a safer working environment and generate adequate data for future reference [11].

There are some basic steps for performing the calibration of an instrument by a chemical engineer such as choosing reference principles with recognized values in order to comprise the range of interest. Besides, measurements on the reference principles with the equipment to be calibrated. In addition, finding a functional relevance among the measured and known values of the reference principles (normally a least-squares fit to the data) called a calibration curve. In the end, making correction for all measurements by the inverse of the calibration curve that made in the previous step [12].

Evidence for in support of this position can be found in the frequent task of a chemical engineer to perform calibration for the instruments. Instruments need to be calibrated before any measurements that need extremely precise data. Moreover, when utilizing equipment for a long time due to the change of measurements conditions. Calibration is

recommended after any sudden and unexpected action happened to the instrument such as hitting the instrument by mistaken or falling down. Not only this, when the measurements of an instrument are questionable [13]. In the end, each equipment will require to be calibrated sporadically to ensure it could perform completely and safely. Manufacturers will elucidate how frequent the equipment will require to be calibrated. Chemical engineers always adopt the idea that there are a lot of chemicals and substances existed in medical laboratories that need as accurate as possible of measurements in order to equip the medical team a safer working situation.

3. CONCLUSIONS

Chemical engineers have provided a great medical service by introducing these materials to the medical field. Which execute, supplements, or replaces a natural task. Besides, biocompatible materials may be derived either from nature or synthesized in the laboratory utilizing several chemical approaches. It is important however to emphasize the contribution of chemical engineers in many fields of healthcare especially in laboratories. Their influence in obtaining accurate and well-performed tests.

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