UNIVERSITI TEKNOLOGI MARA

PREPARATION AND CHARACTERIZATION OF 3-D PLGA SCAFFOLD FOR TISSUE ENGINEERING

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ABSTRACT

Tissue engineering has emerged as a promising approach in the treatment of malfunctioning or lost organs. In this approach, a temporary scaffold is needed to serve as an adhesive substrate for the implanted cell and a physical support to guide the formation of new organs. The objective is to prepare and characterize variety PLGA scaffolds with different morphology, mechanical properties and porosity using different ratio of lactic to glycolic acid in the PLGA and different size of salt (NaCl) which range from ≥ 200μm, 100μm to <200μm and <100μm . PLGA is used in this study due to its non-toxic, biodegradable and biocompatibility effect in the human body. The method use in this study is solvent casting / particulate leaching method which involve the casting of a mixture of polymer solution and porogen in a mold, drying the mixture, followed by a leaching out of porogen with water to generate the pores. The results of the analyses showed that the size of the salt and ratio of lactic to glycolic acid content in the PLGA do give effect to the mechanical properties and porosity of the PLGA scaffold.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Tissue engineering offers a new paradigm for the treatment of trauma and disease or aging-related loss of tissue function, combining engineering approaches with principles from the life sciences to develop biological substitutes that restore, maintain, or improve tissue function. From its very beginnings, tissue engineering followed one of three major approaches by which artificial tissue can be created within the body of a patient. The first, exemplified by the work of Vacanti and Langer (1999) combined isolated cells and biomaterial to create the artificial tissue in vitro. In this approach, cells are seeded onto a biomaterials prior to use or implantation of the device. The second approach, illustrated by the pioneering work of Yannas and Bruke (1981), they use the implantation of an acellular (e.g., cell-free) scaffold to guide the generation of new tissue in vivo. In this approach, the attachment of cells onto the biomaterial occurs only after the implantation of the device. Finally, some researchers attempt to generate functional replacement tissues in vitro and apply directly without the need of any biomaterial components. This approach is exemplified by the work of Auger, who developed a tissue culture system for the formation of functional skin tissue that can be applied directly to the patient to cover various wounds.