



CHAPTER I

INTRODUCTION

The success of complete or partial dentures depends on esthetics, comfort, and function. The health of the denture supporting tissue in the patient has an influence on the denture function. Chronic soreness is a significant problem for denture patients with diabetes or other debilitating disease and for many geriatric patients. In addition, patients with heavy bruxing or clenching habits may suffer the same consequence. The soft denture-bearing mucosa is confined between the hard denture base and the bony support. During function, the damage can be done to the supporting tissues resulting in chronic soreness, pathologic changes, and bone loss. To alleviate functional and nonfunctional stresses from the denture bases to the underlying supporting tissues, the soft resilient lining material is designed to be placed between the hard denture base and the soft mucosa covering the alveolar bone. These properties make soft denture lining materials useful for the treatment of patients with ridge atrophy or resorption, bony undercuts, bruxing tendencies, congenital or acquired oral defects requiring obturation, xerostomia, and denture opposing natural dentition in the opposing arch. Recently, there are several commercial products of soft lining materials available in the market. The commonly used soft lining materials are heat polymerized and autopolymerized acrylic resin, heat polymerized and autopolymerized silicone. Even though these products work efficiently, they still have some disadvantages and limitations. These products cannot remain well serviceable for extended periods of time. They are considered temporary expedients. Their service expectancy does not compare with that of the hard denture base. Failures are

associated with poor physical and mechanical properties that foul the lining materials by fungal and bacteria growth and poorly bond to denture base materials. Attempt to find a new soft lining material with the better quality has been performed to solve these problems. We have found that natural rubber has some qualifications that fit for being a soft lining material. Rubber had been recorded as the earliest soft lining material. It was used for a short period of time since it had high water absorption and became foul and ill fitting. To overcome this problem, appropriate modifications of rubber have to be considered.

The objectives of this study were to develop a soft lining material from natural rubber and to investigate the properties of the newly developed material. In this study high-ammonium natural latex from *Hevea brasiliensis* tree was vulcanized and grafted with ethyl methacrylate monomer by gamma-irradiation in order to improve its qualities to be appropriate for using as a soft lining material. The grafted product was then studied for its particle ultrastructure, physical and mechanical properties, and cellular biocompatibility by using light and electron microscopes, universal testing machine and human gingival fibroblast co-culture method.

The results from this study will hopefully lead to the accomplishments of a new soft lining material from natural rubber and new knowledge on modifications of natural rubber.