CHAPTER 1: INTRODUCTION

1.1. Background

Aging is an essential and inevitable part of the biological process in living organisms. As a slow and chronic process, aging causes the gradual deterioration of physiological functions necessary for survival and fertility, such as deoxyribonucleic acid (DNA) repair and immune responses. The skin exhibits the most visible signs of aging due to its large volume and location on the body surface; creating an issue for most of the population which idealizes young and healthy skin. Hence, considerable efforts have been exerted in the cosmetic and pharmaceutical sectors as a way to find remedies to delay or reverse aging (Kazanci, Kurus, & Atasever, 2016).

Most anti-aging products target extracellular matrix (ECM) component production by fibroblasts, as its reduced production is one of the main mechanisms of dermal atrophy, a condition tightly related to aging. One of said targeted ECM components is collagen, especially type I and III collagen. Type I collagen typically constitutes 80% of the total collagen content in young skin; this is followed by type III collagen which constitutes 12%. With its role in providing tensile strength and elasticity to the skin, changes in collagen content would be visible through the level of skin wrinkling. Interestingly, it has been observed that both type I and type III collagens are most prominent in their decrease throughout aging, further emphasizing the significance of both collagen types in aging. In addition, both collagen types have been found to work cooperatively to maintain skin functions (Reilly & Lozano, 2021). With such findings, the efficacy of an anti-aging product can be tested from its ability to induce type I and III collagen production.

To test cosmetic products, it is essential to have appropriate test systems to properly simulate the complexity of human skin; a property which is not represented in two-dimensional (2D) cell cultures. Hence, artificial skin equivalents such as the EpiDerm™ Skin Model can be used as a solution. The ability of skin equivalents to simulate processes involved in the skin, such as penetration, makes it ideal for usage in this study (Neupane et al., 2020).

1.2. Objective

The objective of this study is to evaluate the effect of active AAG1-AAI on type I and III collagen in human dermal fibroblasts (HDF) with the EpiDerm™ Skin Model artificial skin equivalent using enzyme-linked immunosorbent assay (ELISA).

1.3. Scope of Work

The scope of work of this study included cell culture and maintenance of HDF, cell viability assay using MTS to determine non-cytotoxic concentrations of the products, and type I as well as type III collagen expression measurement using ELISA.

1.4. Hypothesis of Study

It was hypothesized that treatment of HDF with a product containing active AAG1-AAI using EpiDerm™ Skin Model artificial skin equivalent would result in the increase of type I and III collagen production, reflecting the anti-aging effectiveness of active AAG1-AAI on human skin.