I. INTRODUCTION

I.I. Background

Progerin is a mutated form of lamin A protein caused by the mutation in the LMNA gene. This protein itself is a significant component of nuclear lamina, which is located between the inner membrane of the nuclear envelope and chromatin (Gruenbaum & Foisner, 2015). In normal condition, lamin A protein has important roles in providing structural support and also maintaining the shape of the nucleus, as well as the nucleus' assembly and disassembly throughout cell division (Bidault et al., 2020; Danielsson et al., 2022). Due to this, the mutation of lamin A protein into progerin can cause several impacts, including the alteration of nuclear lamina structure and also numerous downstream nuclear defects, such as the modification of nuclear morphology and the increase of nuclear stiffness (Gruenbaum & Medalia, 2015; Stephens et al., 2018).

In healthy people with normal aging, progerin can be found at a low level in dermis fibroblast and keratinocytes that have terminally differentiated (Skoczyńska et al., 2015). On the other hand, high levels of progerin are present in people with Hutchinson-Gilford Progeria Syndrome (HGPS), a fatal premature aging disorder which has the average age of death of 14.6 years (Gordon et al., 2018; Sun et al., 2020). The over-expression of progerin itself is fatal since it can cause morphological changes of cells, which could lead to cell loss (Skoczyńska et al., 2015). In more detail, these morphological changes appear to be really significant in skeletal muscle cells. The reasoning behind this is because among the cells that are affected the most by progerin (e.g. cells in musculoskeletal, cutaneous, and cardiovascular systems), central nucleation can only happen in skeletal muscle cells (skeletal myocytes), resulting in a more observable cell damages (Dubinska-Magiera et al., 2013; Oshima et al., 2013). However, aside from central nucleation and cell loss, the other specific morphological changes of the skeletal myocytes due to the expression of progerin are still unknown. In addition, since myocytes are long cylindrical structures that construct the muscle tissue, detrimental changes of myocytes would certainly affect the body weight of the person, considering the fact that skeletal

muscle makes up approximately 40% of total body weight (Frontera & Ochala, 2015; Mu et al., 2020; Vidak & Foisner, 2016).

I.II. Research Objectives

This study is aimed:

To investigate the morphological changes, particularly the change of central nucleation percentage and area size, that occur in skeletal muscle (femoris and gastrocnemius-soleus) myocytes of one month progeric mouse tissues in correlation to the expression of progerin.

I.III. Research Hypothesis

The expression of progerin:

1. Increases the central nucleation percentage significantly.
2. Decreases the area of the skeletal muscle (femoris and gastrocnemius-soleus) myocytes significantly.