Effects of progressive resistance training on the expression of long non-coding RNAs in skeletal muscle of young adults

## Abstract

## Background

Long non-coding RNA (lncRNA) genes play regulatory roles in both health and diseases (*1*) but most publicly available research are focused on their roles in diseases, especially cancers, almost leaving the impression that the regulatory roles ascribed to lncRNAs are only disease related. It is thus important to also investigate their functional roles in health promoting activities like exercises.

Numerous studies have reported the gene expression patterns following resistance exercise but how these patterns are regulated is poorly understood. Since lncRNAs are said to play regulatory roles, it is thus pertinent to understand the lncRNAs that play the regulatory roles with the aim of not just understanding how they play the roles, but also understand how to optimise the benefits accruable from PRET

Progressive resistance exercise training (PRET); a type of exercise where the skeletal muscle is exercised against progressively increased types of resistance (*2*) such as free weights , is the most potent non-pharmacological method of stimulating muscle hypertrophy and countering the loss in muscle strength and mass (*3*)., Factors internal to an individual are the main regulators of the benefits of RE such as muscle hypertrophy (*3*) . Such internal factors include ribosome biogenesis, transcriptome profile and responses etc (*3*)

The skeletal muscle is important for physical health and vitality and responds to both use and disuse by hypertrophying and loss of muscle strength and mass respectively (*3*) . It adapts to physical activty (RE) or inactivity by hypertropying or muscle loss respectively . It is therefore of necessity that increasing research is focused on exploring and understanding mehanisms through which the skeletal muscle can contribute to improved human health.

Several studies have explored the expression of genes in response to PRET to determine which mRNAs are differentially expressed and thus the mechanisms through which PRET elicits the beneficial effects i t is reputed to have. Almost all the published literature available on functions of lncRNA are related to their roles in disease conditions, most cancers. This research is exploring the role of these groups of genes in health promotion,vis-a-vis resistance exercise

. Long non-coding RNAs aee defined as non-coding RNAs of more than 200 nucleotides length. quite little is known about the majority of lncs (*4*) . Long non-coding RNAs (lncRNAs) are said to regulate cellular physiology and function (*5*) , gene expression (*6*) and are poorly annotated functionally. Diverse research suggest different lncRNAs play divese functional roles (*7*) such as in the cell such as cell cycle regulators (*8*) , differentiation (**del?**)�s2017 and in metabolism (*9*) As regards PRET, we deem it important to explore the deferentially expressed lncRNAs and the protein coding genes coexpressed with them, hoping to contribute to the body of knowledge about lncRNAs and their functions especially as regards PRET .

This study aims to identify lncRNAs that are differentially expressed based on exercise conditions, ie between the trained and untrained and between volumes among the trained. This should help characterise the impact of lncs in PRET conditions. Since the lncs are reported to affect cellular functions of physiological relevance (*6*), it is perhaps logical to posit that it would be influenced by PRET in humans

Identify protein-coding genes that show the same expression pattern with the DElncS

Most lncRNAs are not functionally annotated. This work hopes to contribute towards elucidating the functional roles of lncRNAs.

some lncs regulate the process of muscle regeneration (*10*)

lncs have shown different expression patterns following different exercise training programs (*1*)

## Methods

RNA sequence analyses from vastus lateralis muscle biopsies of 24 individuals aged ………… who perfomred PRET as described by Hamarsland et al. Changes in lncRNA gene expression that occur with PRET was analysed based on volume, and training or the absence of it

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