Lactose is a disaccharide that is made of two sugar molecules of glucose and galactose held together by glycosidic linkage. LPH enzymes, which lie in the brush border membrane of the small intestine, hydrolyze |æ&c[•^c[]¦[å`&^D-*|`&[•^æ}åD-*æ|æ&c[•^æ}åæ\^æ&ciç^|^ æà•[¦à^åc[be exported to the liver for metabolism (Kuchay, 2020). The initial polypeptide that forms from this gene is called preprolactase (prepro-LPH) which is

T@^¦^ æ¦^ ~[`'| åå ^\^}c ~[' { • [~ |æ&cæ•^ ^}:^ { ^ å^,&i^}&. P'i { æ-¦^ |æ&cæ•^ ^}:^ { ^ å^,&å^}&^ i• c@^ { [•c &[{ { [} c^]^ [~ |æ&c[•^ i}c[|^!æ}&^ æ&¦[•• c@^ ,[¦|å

The activities of LPH enzymes are maximal at birth when we @^æçi|^ |^|^ [} à |^æ•c { i|\ ~[| • `|çiçæ|. H[,^ç^|, c@^ { æb[|ic^ , [||åq• population experiences a decline in the production of LPH enzymes from the toddler years to young adulthood (Olds, 2003). Why do most i}åiçiå xe|• à^&[{ ^ |æ&cæ•^ }[]-]^\•i•c^}&^ (LNP) æ}å [c@^\• { æi}cæi} |æ&cæ•^]^\•i•c^}&^ (LP) c@\[* @[c c@^it |i-^? W@æc æ ^&c• c@^ æ { [`}c of LPH enzymes produced in the small intestine? Two main genes conc¦[| c@^]¦[å`&ci[} [~ LPH ^}:^{^•: |æ&cæ•^ *^}^ (LCT) æ}å {i}i&@;[-دْ i• دو^ { [• د &[{] [› [› [»&د[• i] c[› [›] › [› [› [› [› [›] › › »] & › › ([]] › › د 6 (MCM6) * › › › . @[› › › · › › . @[› › ›] › .] › @ · › › · › .] / ٥ [› › · › · ·] / ٥ [› › · › · ·] / ٥ [› › · › · ·] / ٥ [› · › · ·] / ٥ [› · › · · ·] / ٥ [› · › · ·] / ٥

Currently, there is no cure for lactose intolerance; however, most people are able to manage their symptoms by cutting down or avoiding food and drinks containing lactose and replacing them with lactose-free alternatives (NHS _^à•ic^, 2021). Oç^¦-c@^-&[`}c^¦ { ^åi&i}^, •`&@ æ• Læ&cæiå, &[}cæi}• lactase enzyme derived from Aspergillus oryzae which can aid in the digestion of lactose. When taken together with dairy products, Lactaid will break down the lactose into glucose and galactose for digestion and patients will

à}*^•cà}* æ •]^&à,& å[•^ [~ |æ&c[•^. A |æ&c[•^ à}c[|^!æ}c]æca^}c _ al| @æç^ an increased amount of hydrogen gas in their breath after ingesting lactose. This is due to undigested lactose traveling down to the large intestine where it is fermented by bacteria that produce hydrogen. On the other @æ}å, c@^ |æ&c[•^ i}c[|^!æ}&^ c^•c !^~`i!^•]æci^}c• c[å!i}\ |æ&c[•^ •[|`tion, and their blood samples are taken to measure the amount of blood glucose their blood contains. In this case, patients with lactose intolerance will not experience a rise in blood glucose levels since they are not able to break down lactose into glucose. Clinical testing and a history of symptoms such as bloating, abdominal cramps, and diarrhea after ingesting lactose]¦[å`&c• æ¦^ `•^å c[åiæ*}[•^ |æ&c[•^ i}c[|^!æ}&^ (NHS ,^à•ic^, 2021).

The declined activity of the lactase-phlorizin hydrolase (LPH) in intestinal cells after weaning results in adult-type hypolactasia, also known as lactose intolerance. The LCT gene provides instructions for making lactase-phlorizin hydrolase (LPH) which digests lactose, a sugar found in { i|\ æ}å [c@^¦ åæil^] | [å šc•. A •] ^&i, & DNA •^ * }&^ ic@i} c@^ MCM6 gene called a regulatory element helps control the expression of the LCT ^}^ (MCM6 G^}^: M^å|å}^P|˘• G^}^cå&•, }.å.). Så}&^ ác ǎ• ˘}&|^æ¦ @[, the LCT gene can be dramatically downregulated with age in most individuals, but remain active in some, it is important to investigate the possible causation. In this report, I will introduce past research that investi-*æc^å LCT æ}å MCM6 *^}^• æ}å ^]i*^}^ci& ~æ&c[¦• c@æc &[}cliàčc^å c[lactase persistence and lactase non-persistence among humans and mice.

Carbohydrates, one of the main nutrients that keep us alive, are

found in foods and drinks that we consume and come in a variety of forms depending on the source. Of those, lactose, commonly known as milk

sugar, is the main carbohydrate found in dairy products such as milk,

cheese, yogurt, and some prepared packaged foods such as bread and

pancakes. Lactose is made of two sugar molecules called disaccharides.

. Sä}&^ [`¦ à[å^ `•^• &æ¦à[@^妿c^• ä} c@^ •ä{]|^•c ~[¦{ [~ {[}[•æ&&@æ-

¦ãå^• ~[¦ ^}^!*^

&^ (CLD) i• æ ¦æ¦^¦ ~[|{ [~ c@^ &[}åici[} c@æc]|[å`&^• ç^¦^ |icc|^ [¦ }[lactase. The baby will develop this symptom if both parents have mutations in the lactase (LCT) gene, therefore impairing the body's ability to make lactase enzymes. In this case, the baby cannot tolerate breastmilk or regular infant formula, as this will cause excessive diarrhea and dehydraic• { aec i^ ~[! { [~ LPH ^}: ^ {^•. H[, ^ç^!, [}|^ 60% [- c@^ i}iciae|]!^-

This experiment aims to analyze the relationship between the epigenetic factors of aging and a phenotype-related environmental change, •]^&i,&æ||^ æ |æ&c[•^-&[}cæi}i}* åi^c. E]i*^}^ci& ~æ&c[!• •`&@ æ• æ*ing and diet are known to change the expression level of the LCT gene which produces the LHP enzyme responsible for digesting milk products (O@ ^c æ|., 2017). T@^ ¦^• `|c ~![{ c@^]|^çi[`• •c`å^ à^ O@ ^c æ| i} 2017 &[}&|`å^å c@æc {i&^ c@æc ,^¦^ ~^å |æ&c[•^ i}&!^æ•^å LCT { RNA |^ç^|• in the enterocytes in the small intestine compared to mice without lacc[•^ i} c@^i¦ åi^c. M[¦^[ç^¦, c@^i¦ •c`å^ åi•&[ç^¦^å c@æc LCT *^}^ c!æ}scription in the small intestine can be suppressed by epigenetic factors such as aging. Therefore, this experiment will further explore how the LCT { RNA ^¢] \^••i[} |^ç^| &@æ}*^• ,ic@ æ*^ æ}å ,@^c@^\][•c-æå`|c mice that are fed a lactose-containing diet can maintain their LCT gene expression when they age. In addition, this experiment can also help determine which epigenetic factors (aging vs diet) are more likely to induce the change in LCT gene expression among mice. The result of the proposed experiment may support one of the hypotheses listed below.

H1: T@^ LCT { RNA ^¢] '^••å[} |^ç^| å^&'^æ•^ , ic@ æ*^. A*^ i• æ •c! [} *^! epigenetic factor than a diet.

H2: T@^ LCT { RNA ^¢] '^••i[} |^c^| i}&!^ $e^^a$, ic@ e^* . Di^c i• e^c [}*^! epigenetic factor than age.

H3: T@^ LCT { RNA ^¢] ¦^••i[} |^ç^| { æi}cæi}^å &[}•cæ}c ,ic@ æ*^.

H0: N[$\dot{a}_i \wedge_i \$ $0^{\circ} \wedge_i \$ $0^{\circ} \wedge_i \$ Ac] $\wedge \circ i$] $(- 0^{\circ} \wedge_i \$ Ac] $\wedge \circ i$] $| \wedge \circ i$] $| \wedge \circ i$] $| \wedge \circ i$] adults and senior mice.

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