

Editorial

Musings on the History of the American Diet: Focus On Small RNAs

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Introduction

On a recent business trip, I traveled to Denver Colorado. I took extra-time to sightsee and learn about the local history. One stop on the tour was at the statue of a Native American hunter and a buffalo. This reflects the early diet of the area as including buffalo (American bison) meat. Other traditional foods of Native Americans from the Colorado area included fish, various game animals, beans, corn, squash, nuts, fruits, seeds, and greens [1, 2]. Reflecting on the historical changes in the American diet brought to mind a few thoughts. I would like to share some of these musings concerning small RNAs.

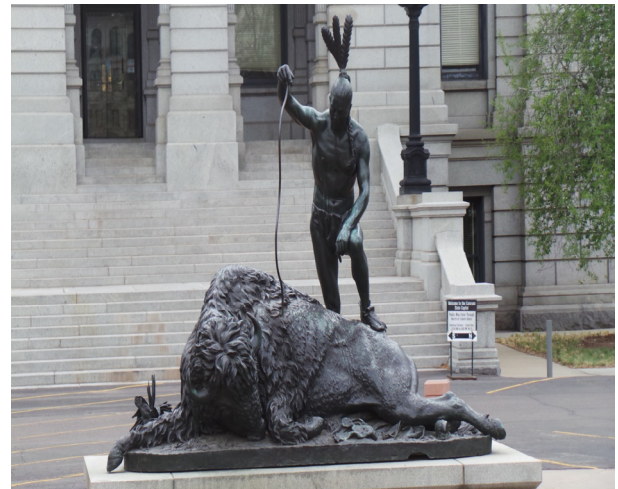
Exogenous Small RNAs From Dietary Sources?

There has been recent speculation about possible inter-species actions of small RNAs absorbed through the digestive tract [3,4,5,6,7,8,9]. Endogenous small RNAs (miRNAs, circRNAs, and other ncRNAs) play key roles in regulating cellular functions [10,11,12,13,14,15,16,17,18]. Therefore, could exogenously derived small RNAs, from food and from the gut microbiota, also impact physiology? It has been asserted that environmental factors – diet, obesity, exercise, psychological stress – regulate small RNAs [8,13,19,20,21]. This raises the question – do cattle raised in vastly dissimilar conditions from wild buffalo display altered small RNA expression that might impact the health of the consumer? [4,22,23].

Exogenous Small RNAs From The Microbiota?

The gut microbiota feed on nutrients from the foods that we consume, with different microbes having different nutrient preferences [24,25]. Various nutrients, including fiber, fatty acids and phytochemicals, can influence the gut microbiome composition [25,26,27,28]. Sweeteners may have an unhealthy effect on gut microbiome composition [29]. The ratio of different dietary fatty acids has changed dramatically over the course of human history [30,31,32]. In addition, modern ultra-processed foods are often loaded with sweeteners and are deficient in fiber (Delgado, 2015; Suez, 2014). Could diet-induced changes in the microbiome composition result in altered ratios of microbiota-derived small RNAs that might influence host physiology? It has been proposed that diet-related dysbiosis is trans generational via diet-induced extinctions of key the gut microbiota, an effect that

compounds over generations [24]. What impact might this have had on chronic disease epidemiology today?



Diet and Endogenous Small RNAs?

The genome has long been referred to as a blueprint; however, a more apt analogy would be a cookbook with (epigenetic – including small RNAs) sticky notes directing the chef as to which recipes to use. The arrangement of the epigenetic sticky notes in the genomic cookbook and the resulting (phenotype) buffet spread are influenced by the environment [33,34]. For example, various nutrients, such as phytochemicals and fatty acids, are believed to regulate the expression of endogenous small RNAs [35,36,37]. Today, many individuals consume ultra-processed foods that are deficient in key nutrients [38,39,40]. Comparing the early

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American diet, as represented by the statue in Denver, to a modern ultra-processed diet, one might ask, has this dietary shift altered endogenous small RNA expression? Could this influence the risk of chronic disease?

Could A Solution Be Public Health / Social Entrepreneurship?

Improved nutrition, including eating more fruits and vegetables, could greatly reduce the incidence chronic disease [41,42,43]. Perhaps, small RNAs are one of the mechanisms that might be involved. Public health entrepreneurial businesses, such as Fruit Guys, are working to enable more people to eat healthier, more nutrient-rich diets [44]. Could public health entrepreneurs create new products utilizing ingredients with superior functional value to replace today's ultra-processed items? [45]. Could a grass-roots, free-market, entrepreneurial approach hold the key to improving the American diet – to make it the best American diet yet?

Musings on Contemplation

Some of the mechanisms by which cognitive activity promotes brain health appear to involve endogenous miRNAs [46]. However, despite all the available books, literature, diverse and beautiful natural environments, etc., that can be utilized for contemplation, some people spend more than 40 hours a week, zombie-like, watching mostly inane television programs [47]. In contrast, George Washington Carver found that silent contemplation and prayer during walks in the woods provided the insight and creativity that led him to becoming one of the greatest scientists in American history [48]. Professor Carver stated, "Since new developments are the products of a creative mind, we must therefore stimulate and encourage that type of mind in every way possible." We need creative public health / social entrepreneurs working both in nutrition and in promoting cognitive engagement to reduce the prevalence of chronic diseases such as Alzheimer's disease.

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