

# **Slow & Steady Wins the Race**

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**REVISED**

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## **ABSTRACT**

In the past decade, childhood obesity has increased at alarming rates. Educating children about healthy eating habits is thus of necessity to the health of our nation in the future. There are three major classes of macronutrients necessary to the human diet: carbohydrates (simple and complex), proteins, and fats. The following model incorporated the idea of healthy nutrition, emphasizing the importance of balance between nutrients in the diet. To demonstrate the importance of this concept, three representative meals were used corresponding to differing amounts of balance in the diet. Children were each assigned a meal. Activities (i.e. bubbles, jump rope, balls for catch, a hula hoop, and a math test) were available to the children at five different stations. Children with an excessively sugary meal were only able to go through one station, children with a sugary yet balanced meal through three stations, and children with the healthiest meal through all five stations. Although this model was not as in depth as the subject matter would have allowed, it was well understood by the children who were able to see how balanced nutrition can apply to their lives.

## **INTRODUCTION**

Obesity is undoubtedly one of the biggest health concerns in America. The past few decades have brought dramatic changes in the way Americans live and eat. These trends are especially alarming in the child and adolescent populations. From 1979 to 1980, seven percent of children (ages six to eleven) and five percent of adolescents (ages 12 to 19) were obese. These numbers dramatically increased over the past two decades to 15.3 percent for children and 15.5 percent for adolescents in the year 2000 (3). One must keep in mind that these numbers represent the percentage of children that are obese; the number for those that are simply overweight is naturally much higher. There are many causes for this disturbing trend. Examples include: the growth of the fast food industry, the abundance of processed food with higher caloric content, increased amounts of time spent watching television, cutbacks of physical education in schools, and aggressive marketing of unhealthy snacks and soft drinks. Childhood obesity can lead to heart disease, diabetes, stroke, and other vascular-related illnesses in adulthood. Thus, obesity in children is a very important topic to examine and hopefully change.

There are three major classes of macronutrients that are necessary to living organisms: carbohydrates, proteins, and fats. All three of these macronutrients improve memory and cognitive function and thus are all necessary to the diet (7). Carbohydrates constitute the main

source of energy for the body and are usually the only source of energy used by brain cells. The glycemic index (GI), represented as a number, is a property of foods containing carbohydrates. This number describes the rise of blood glucose levels after ingestion of a particular food. Foods with a high GI produce a rapid increase in blood glucose and insulin levels, resulting in rapid digestion. This leads to short-term satiety (1), but to increased consumption of energy in the long-term (8). This spike in blood glucose and its subsequent rapid digestion leads to a decrease in energy supply to the brain. Many foods common to the Western with very high GIs, such as white bread and foods high in sugar, may lead to premature hunger, overeating (9), and cognitive difficulties (10). In contrast, foods with low GIs (such as fruits and vegetables), promote long-term satiety (2) and a continuous supply of glucose to the brain (10). Low GI foods also raise good (HDL) cholesterol, which is beneficial because it prevents the formation of plaques along arterial walls (6).

Proteins and fats are used by the body through different mechanisms than those used with carbohydrates. Fats directly affect blood cholesterol levels. Foods containing saturated and hydrogenated fats (butter, margarine, deep-fried chips, etc.) raise bad (LDL) cholesterol, while foods containing monounsaturated and polyunsaturated (nuts, olive oil, fish) fats raise good (HDL) cholesterol while lowering LDL cholesterol (4). Fats are beneficial to the diet in that they contribute to feelings of satiety (5). Proteins also contribute to satiety, even more so than carbohydrates (1).

This model project involved teaching children about the importance of balancing macronutrients in the diet and which nutrients constitute beneficial and consistent sources of energy. The model contained a variety of food choices (represented by plastic food items) that vary in terms of nutrient makeup. Such choices included such foods as fruit, vegetables, candy, and bread. The children selected a particular food at random and the activities available varied depending on the food. Activities included jump rope, math problems, bubble blowing, a game of catch with a ball, and hula hooping. So, for example, children with more vegetables would be able to do more activities than those with candy. The more nutritious the food (in terms of nutrient balance, fat content, and carbohydrate type), the more energy is available to be utilized by the body and brain. Hopefully, children will gain an understanding of what healthy nutrition is and what it means for the body and the brain. For example, although sugary foods may seem like a satisfying choice, the long-term result is decreased energy. By learning about what food actually does in the body, children will be more informed and better able to make wise food choices in the future.

## **METHODS & MATERIALS**

Our model began with the story of the tortoise and the hare. The children were told that by the end of the demonstration, they would know why the tortoise won the race. This was the inspiration for our title “Slow and Steady Wins the Race.” An explanation of macronutrients and their digestion in the body followed. To illustrate this, two posters were made. One entitled “3

Macronutrients” contained pictures of a simple (e.g. glucose) and complex carbohydrates (e.g. starch and cellulose), a healthy fat (e.g. omega-3), and a protein (e.g. a polypeptide chain). Glucose, starch, and cellulose were all representative of carbohydrates, one of three macronutrients. See Figures 1-4 for images of these molecules. The purpose of this illustration was to demonstrate for the kids that sugar (glucose) is a very small molecule in comparison to the other three molecules. The second poster, entitled “The Human Body,” showed an image of a body with the pathways the four molecules take upon ingestion. On this poster, glucose was shown to enter the bloodstream and travel to the brain very quickly. We emphasized that once the glucose from certain sugary foods is used by the brain, the body runs out of energy. In contrast, the other three nutrients remain in the body for a longer period of time as absorption occurs more slowly than with sugar. Thus, ingestion of complex carbohydrates, proteins, and fats leaves the body with a continuing supply of energy.

The physical display of three representative meals accompanied the posters. Each meal signified both breakfast and lunch. Meal one was comprised of a hotdog, two cans of soda, chips, jellybeans, and a doughnut. This first meal represented the most unhealthy meal containing an excessive amount of sugar. Meal two consisted of milk, sugary cereal, pizza, juice, and M&M’s. This meal contained a lot of sugar, but also had some protein and complex carbohydrates. The third meal was the healthiest meal, containing fruit, yogurt, granola, milk, and a whole wheat turkey sandwich. Four collages of each meal were made on card stock and yarn was attached to make necklaces. These meals were explained to the children in terms of the nutrient content and then each child was randomly assigned a meal to wear around their necks.

After meals were assigned to each child, the children were instructed to go through each of the five stations, which were labeled (station one = bubble blowing, station two = jump roping, station three = game of catch, station four = hula hooping, station five = a math test). However, the children with meal one were instructed to rest after the first station and children with meal two after the third station. Children assigned meal three were able to complete all five stations. Upon completion of the stations, the children were asked why some were not able to make it all the way through to station five.

## **RESULTS**

For the most part, our model was received very well by the children. Upon completion of the station exercises, the children were immediately able to see why those with the healthiest meal made it the farthest (some kids knew what was going to happen before running through the stations). We were concerned that the kids would not understand the purpose of being shown the molecules or the idea of glucose being a simple molecule and rapidly digested. The children, however, seemed to understand most everything they were told and some even asked specific questions about the molecules. For example, when children were asked why the tortoise won the race with the hare at the end of our demonstration, responses included: “Because the tortoise ate the healthy meal” or “The hare had too much sugar for breakfast.” Many children wrote that

glucose goes to the brain, eating healthy gives you more energy, or sugar is bad for you on their comment sheets. In their evaluations of our project, the majority of the kids said their favorite parts of the exhibit were the activities. We wanted to make our demonstration fun and exciting with a variety of available activities and we seem to have succeeded. There were many enthusiastic comments about the stations. For each of the four criteria used in the evaluations, our scores were generally good. However, there did not seem to be much interest expressed in learning more about the topic of nutrition. This makes some sense considering the age of the kids and their current focus on sugary foods. The impression was made evident though because the kids stopped eating candy being handed out at other booths! In general, positive comments were made on the majority of evaluations and the kids seemed to enjoy themselves while at our booth.

## **DISCUSSION**

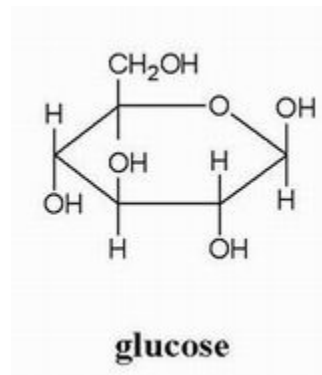
Nutrition is important at all ages especially during a time when childhood obesity has become a serious problem, leading to severe health problems in adulthood. This is especially crucial during a time when modern conveniences take precedence over healthy food choices. Teaching today's children the importance of healthy eating is vital to our nation's health in the future. Secondly, unhealthy eating not only affects physical health, but mental health as well. We stressed that eating poorly (i.e. eating sugary foods without balancing with other nutrients) can lead to decreased performance in school due to the inability to concentrate and the loss of mental alertness and clarity. For this reason, our last station was a math test. The stations represented a day of activities at school and at play. When children made it to the last station, they were congratulated for having the energy and stamina to take a math test at the end of the day.

This model of course had its limitations. Nutrition is a very broad and poorly understood subject. There is much in the field that is open to interpretation, hence the plethora of diets available to consumers. The exact balance of dietary nutrients optimal to health is an issue of heated debate. For example, ten years ago a high carbohydrate diet was the popular way to eat. Carbohydrates have recently been made into an enemy as people choose diets with a minimal carbohydrate load (e.g. the Atkins diet). In our model, we stressed the importance of balancing the three macronutrients, briefly mentioning the food pyramid. We did not, however, mention any specifics about the precise balance needed. Additionally, to be any more specific about balance in the diet may have been confusing for the kids. To remain accurate, we focused on simple carbohydrates, ingested in too high a quantity, not providing sufficient energy for the brain or body. Although our focus was narrow and incomplete in terms of the vast amount of information dealing with nutrition, it was simple enough for the children to comprehend. They were able to apply the idea of balanced nutrition to their own lives and choices.

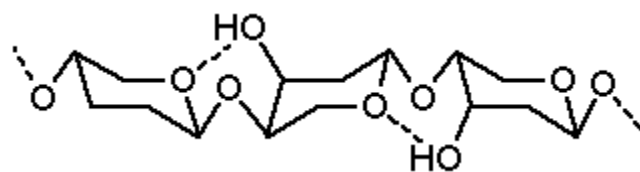
The most notable compromise we had to make during our presentations was decreasing the amount of information we shared with the kids before they were able to move on to the five

stations. This was necessary due to time constraints. The amount of information not only took a large amount of time to discuss, but also may have bored the kids. Having the children listen to relatively complicated nutritional information may not have been wise due to their short attention spans. In light of this, changes could be made that involve a further narrowing of our focus. This could involve, for example, focusing on one macronutrient instead of three. Focusing on simple and complex carbohydrates would be a valid option. Many kids commented that they would have liked to eat the food and see what happens rather than being given a mere representation of food. Incorporating this into our presentation may have established a more immediate relationship between what the kids were eating and what they could physically and mentally accomplish. However, making this change would involve ignoring the fact that digestion of nutrients takes time and does not occur immediately. In conclusion, our presentation was effective in teaching the kids about what kinds of food are better for the mind and body. Changing our model to evoke childrens' interests would involve a very different design that would be more concise and less accurate.

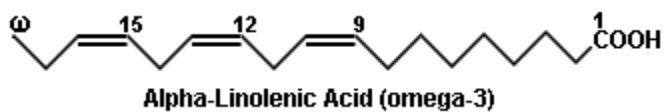
### FIGURES & CAPTIONS



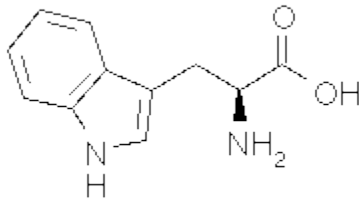
**Figure 1.** A glucose molecule, a simple carbohydrate.



**Figure 2.** Portion of a starch molecule, a complex carbohydrate.



**Figure 3.** A fat molecule, omega-3.



trp w Tryptophan

**Figure 4.** An amino acid, Tryptophan, a building block of proteins.

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