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the inaugural issue

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Polyphenols in Chocolate

BY CAITLIN CLARK, MS

What are "Polyphenols" and What Do They Do?

Polyphenols are the compounds most strongly associated with the health benefits of chocolate. While polyphenols are all slightly different, they have many functional properties in common. Research shows that consuming polyphenols can enhance the benefits of other healthy choices by scavenging, or reducing, harmful molecules in the body which promote oxidative stress [1]. Two common polyphenols found in chocolate, catechin and epicatechin, are special in their ability to cross the blood-brain barrier. This capability has been associated with improvements in vision, cognition, and brain health [2]. Widely recognized as an antioxidant, chocolate is an excellent vehicle for polyphenol consumption. While native cocoa polyphenols are not absorbed well by humans [3], the simultaneous intake of sugar enhances polyphenol absorption [2].

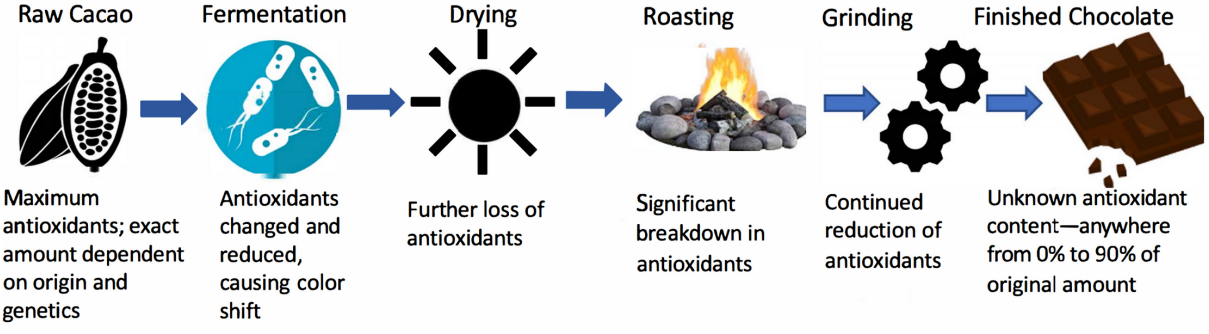
Chocolate Color

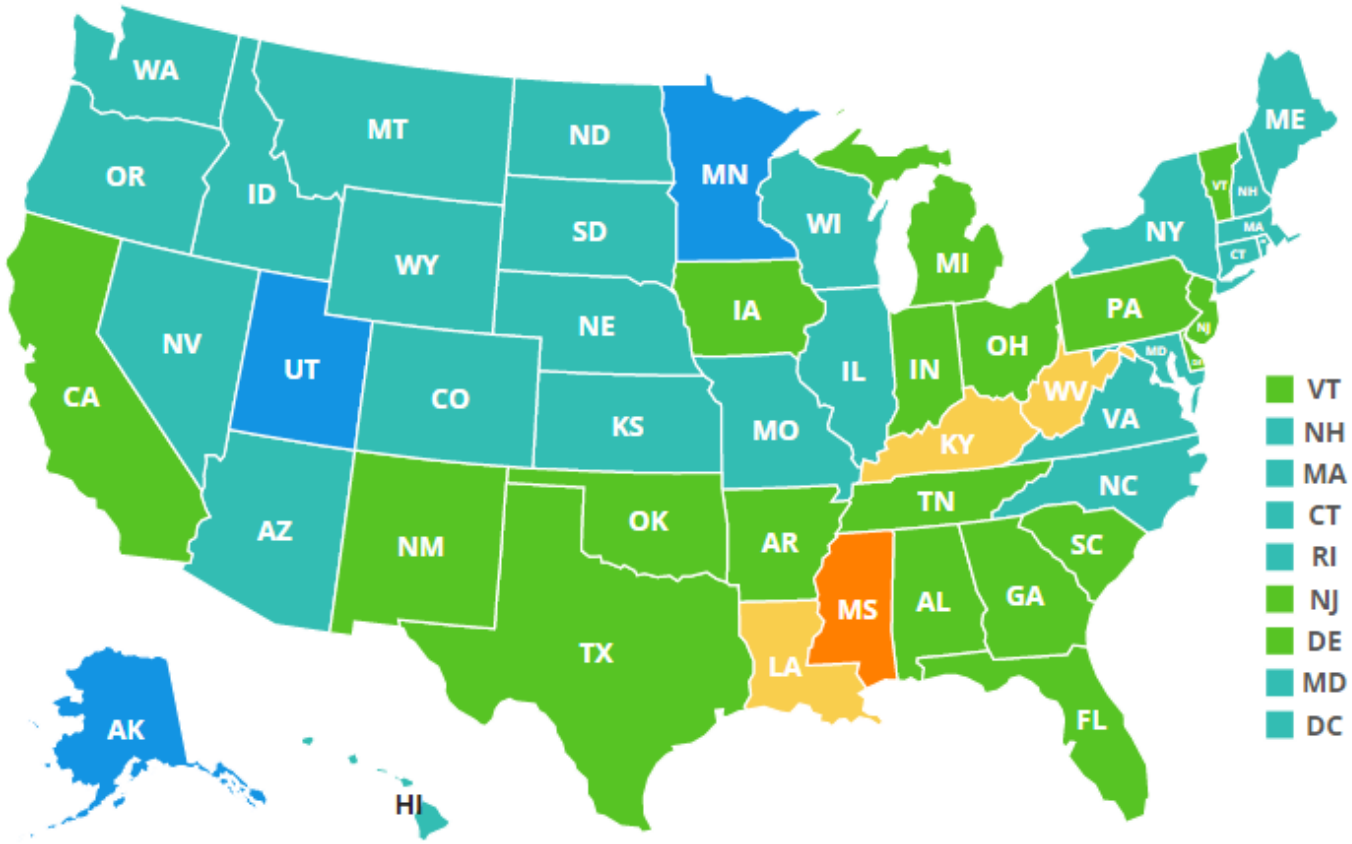
Polyphenols are also the compounds that give chocolate its defining color. Raw cacao beans are a deep purple [3–5], but become brown during fermentation when large polyphenols known as anthocyanins are broken down into smaller phenolic compounds. These smaller compounds are usually colorless at first, but they quickly form chains to make brown-colored pigments known as tannins, giving chocolate its final color [5,6]. Although this mostly happens during fermentation, roasting and refining can also drive changes in polyphenol composition, leading to further color changes. Additionally, the amount of milk and sugar inclusions can affect the color of chocolate, however these ingredients also dilute chocolate's antioxidant content. Thus, to maximize antioxidant intake look for dark chocolate whenever possible.

Polyphenols and Chocolate Processing

While raw cacao beans are extremely high in polyphenols, the processing of cacao into chocolate includes many steps that drastically reduce or even eliminate these antioxidant compounds [4,7]. As a result, antioxidant levels within finished chocolate can vary greatly. Therefore it is very difficult to guarantee the antioxidant content of a given piece of chocolate, despite its common recommendation by nutritionists as a polyphenol-rich "superfood". Despite this variability, consuming a small portion of dark chocolate per night can still be a part of a healthy dietary routine [8].

ANTIOXIDANT LOSS FROM CACAO TO CHOCOLATE





RATE OF OBESITY FOR CHILDREN, AGED 10-17, BY STATE [1].

CHILDHOOD OBESITY IN COLORADO

BY KARA MCIVER

Here in Colorado, we are often surrounded by active, healthy-weight adults. Unfortunately, current obesity rates in the US show our children are on pace with much of the country with about 1 in 10 children considered obese. This is despite a decline in obesity among children, aged 2-4, receiving WIC benefits [1].

Children with obesity are more likely to have heart disease, asthma, low self-esteem, and social issues. They are also more likely to become adults with obesity.

Adulthood obesity is associated with an elevated risk for a number of serious health conditions including heart disease, type 2 diabetes, and cancer [2].

Due to the pressing issue of childhood obesity here in Colorado, many of the labs in the Food Science and Human Nutrition Department at Colorado State University are focused on combating childhood obesity. Based on their research, here are some recommendations to improve the eating habits of kids (and adults too!):

- Research finding: Home food availability of both healthful and unhealthful foods, including fruits, vegetables, meats, and sugar-sweetened beverages significantly predicted reported child intake of these foods [3].
- How-to for you: In order to help kids eat fruits and veggies, they must be available to kids. This means both purchasing them and making them easy to access and eat. Keep your fresh fruit in a bowl on the counter, keep veggies prepped, and in reach for kids in the fridge. Make sodas harder to reach or stop buying them altogether, making them feel more like a treat when you eat out.

- **Research finding:** Use of a default vegetable appetizer in the restaurant setting may be effective in increasing children's vegetable consumption [4].
- **How-to for you:** As soon as you sit down in a restaurant, order carrot sticks, celery, or a side salad for the table. At home, have them waiting on the table while you're finishing cooking dinner. We've found kids are more likely to get more veggies if they *magically* appear before their meal.

- **Research finding:** Regardless of previous cooking experience, fruit and vegetable preferences are positively influenced by providing direct exposure to these foods through tasting or cooking activities. Cooking attitude and self-efficacy can be promoted in inexperienced cookers (mainly boys) by an experiential intervention such as *Cooking With Kids* [5].
- **How-to for you:** Not every meal is going to be doable for kids. But, getting children involved in preparing fruits and vegetables can help improve their diet quality, their attitude towards cooking, and their confidence in the kitchen. All of which can translate to a better diet long-term. Start with an example recipe on the next page, straight from the *Cooking With Kids* program.

Children and adults can all benefit from easy-to-access fruits and veggie snacks, and a little more time in the kitchen.

Overweight and obesity levels are calculated in different ways for children than for adults.

In children, overweight is defined as a BMI between the 85th-95th percentile, whereas obesity is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex. So, for some children, their BMI may be below 25 but they could still fall into the overweight category when compared to their peers.

VEGETABLE PAELLA

Many people recognize paella as a rice and seafood dish from Spain, but there are many different kinds of paella. There are seafood paellas, meat paellas, vegetable paellas, and a famous one called arroz negro, made with squid “ink”! Centuries ago, the Moors brought rice and the special crocus plant that produces saffron from the Middle East to Spain.

SERVES 4 TO 6

INGREDIENTS

1 tablespoon olive oil
½ cup medium white onion, chopped
½ red or green bell pepper, chopped
1 cup medium-grain white rice, such as Cal Rose or Arborio
⅛ teaspoon turmeric
2 cups broth, chicken or vegetable
2 medium tomatoes, chopped, or ½ cup canned diced tomatoes
1 can (15-ounce) white beans (cannellini, navy, or Great Northern), drained and rinsed
¼ teaspoon salt
⅛ teaspoon paprika
⅛ teaspoon dried thyme
3 saffron threads, optional
1 cup frozen peas
2 tablespoons chopped fresh parsley

INSTRUCTIONS

1. In a large skillet or paella pan, heat the olive oil over medium-high heat. Add the onion and bell pepper and cook for 2 to 3 minutes, stirring often until the vegetables have softened.
2. Stir in the rice and turmeric and cook 1 minute more.
3. Add the broth, tomatoes, white beans, salt, paprika, thyme, and saffron, if using. Bring to a boil, stir once, cover, and reduce heat to low.
4. Cook for 25 to 30 minutes, until all the liquid has been absorbed.Add the peas and parsley. Remove from heat and let sit, covered, for 5 to 10 minutes before serving.

Check out more recipes from CookingWithKids.org!

how to:
READ A NUTRITION LABEL

BY KAYL ECTON & KARA MCIVER

Nutrition Facts	
Serving Size	**1 container (150g)**
Amount per serving	
Calories	**130**
	% Daily Values*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 5mg	2%
Sodium 60mg	3%
Total Carbohydrates 16g	6%
Dietary Fiber <1g	3%
Total Sugars 14g	
Added Sugars 9g	
Protein 11g	24%

Serving size refers to how much people typically eat, not how much you should eat. The rest of the nutrition amounts on the label are 1 serving.

Calories refer to the amount of energy in one serving. If you eat more servings, you are consuming more calories. To gain weight, eat more calories than you burn. To lose weight, eat fewer calories.

These are your **important nutrients**. Use the label to see if a food item has more of what you want and less of what you are trying to limit.

Limit: saturated fat, sodium, added sugars

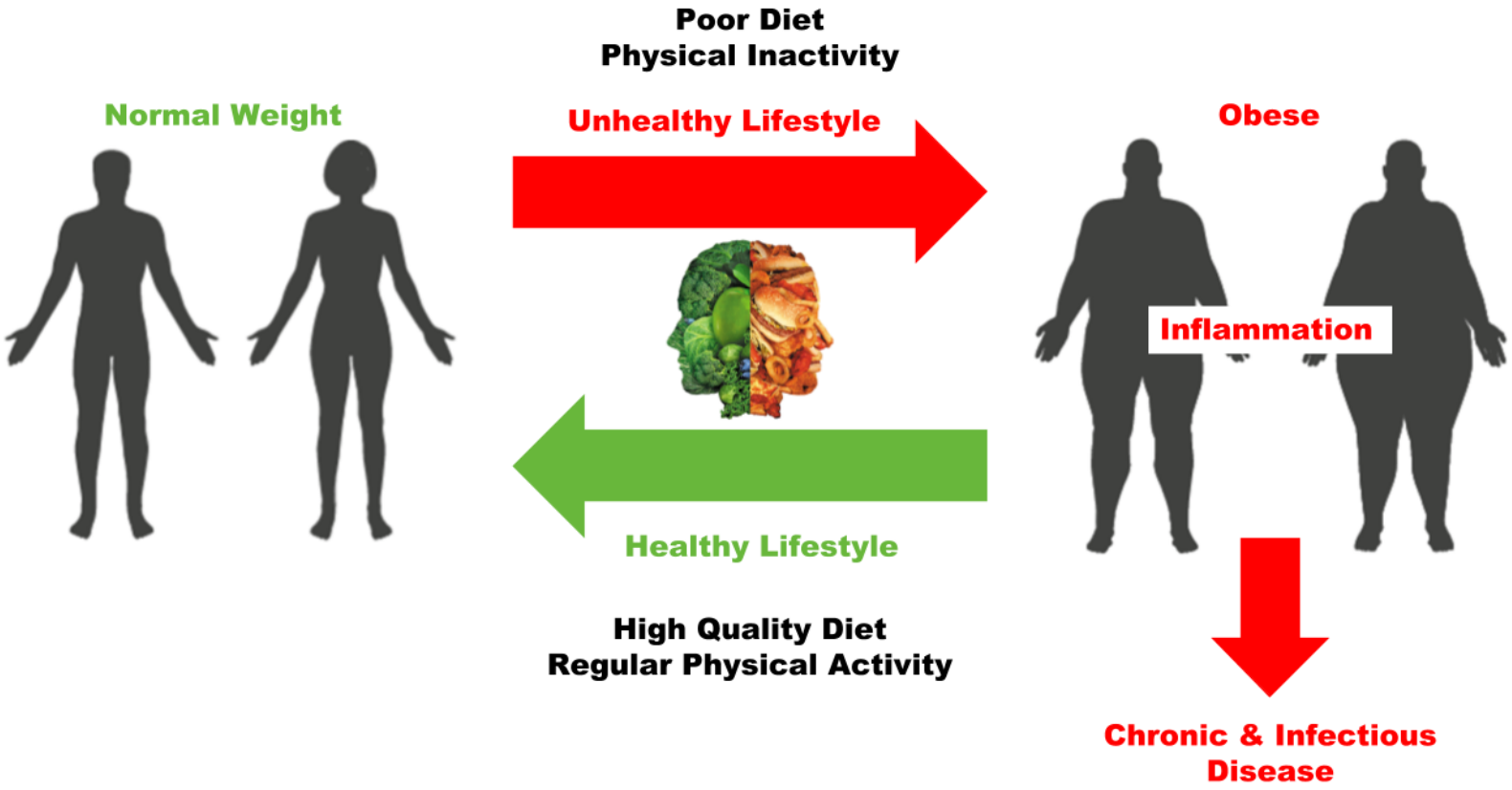
Look for: Dietary fiber, Vitamin D, Calcium, Iron

Not all **sugar** is created equal! Total sugars refer to all of the sugar in a food item, including the naturally occurring sugars in foods like milk and fruit.

Added sugars are sweeteners like honey, syrup, high fructose corn syrup and others that are added during the processing of packaged foods.

The **% Daily Values** shows if a serving contains a high or low amount of each nutrient.

Under 5% is considered “low” & more than 20% is considered “high”.



OBESITY AND DISEASE

BY JESSICA HILL, MS, RN

Consequences of Complacency

Obesity is characterized as an excessive amount of body weight relative to height and is usually calculated as body mass index (BMI) [1]. Clinicians utilize BMI as a screening tool to identify overweight or obesity status [1]. Through the use of BMI, weight can be grouped into categories: underweight (score <18.5), normal weight (score of 18.5-24.9), overweight (score of 25.0-29.9), and obese (score >30) [1].

A bodyweight in any category other than normal is considered unhealthy and may increase one's risk of disease [2]. Uncontrolled weight gain, specifically as fat, leads to the development of obesity. Primary contributors to weight gain include modifiable (poor diet, excessive calorie consumption, physical inactivity) [2, 3] and unmodifiable (gender, race, genetics) [3] risk factors. As modifiable risk factors can be changed to improve health, they are the primary targets of weight management programs. Despite efforts to raise awareness, obesity continues to be a major problem, with roughly 40% of adults [4] and 20% of children (ages 2-19 years old) [5] in the United States (US) considered to be obese.

Obesity is a serious health concern due to its association with a reduction in quality of life and the leading causes of death worldwide, including heart disease, cancer, and diabetes [2]. In addition, the financial burden of treating obesity and its associated health problems has a significant impact on both individuals and the US economy [2]. For example, obese individuals are estimated to pay $1,500 more in medical costs annually compared to normal weight counterparts, driving the total US medical cost of obesity to around $147 billion [2].

Obesity, inflammation, and disease

People associate an immune response with infection or injury, such as the seasonal flu or a wound. Normally, an inflammatory response involves the acute upregulation of inflammatory activities, which resolve once the threat has been removed. However, the immune system and inflammation can also be involved in a wide variety of physical and mental health problems. Inflammation-related diseases, which account for more than 50% of all deaths globally [6], include heart disease, cancer, and diabetes. Nevertheless, inflammation is a vital defense mechanism and is characterized by the activation of immune and non-immune cells which protect us and promote tissue repair and recovery [6, 7]. Certain lifestyle risk factors, such as obesity and diet, are known to inhibit the resolution of acute inflammation, and in turn, promote the development of systemic chronic inflammation [6].

Shifts in the inflammatory response from acute to chronic lead to a breakdown in immune tolerance, causing cell and tissue level damage, as well as impair normal immune function, increasing the risk of infection [6, 7, 8]. Therefore, obese individuals are at an increased risk for developing chronic and infectious diseases, like COVID-19 [2, 7, 8]. For this reason, achieving and maintaining a healthy lifestyle is ideal, not only to prevent obesity, but also to manage overall disease risk.

Although health status changes over time, there are a few key components that can help you become and stay healthy throughout life. A combination of healthy eating and regular physical activity are the most effective ways to lose weight and maintain a healthy weight long-term [9]. A healthy diet should include a variety of different foods that are nutrient-dense, low in calories, and colorful [9]. While physical activity can be anything that gets you moving [10]. Ideally, you want to target as many modifiable risk factors as possible in order to make meaningful lifestyle changes. If you need help creating a long-term diet plan, below are some resources:

Resources

Kendall Regan Nutrition Center (KRNC) at Colorado State University

- Diabetes Prevention Program
- Healthy You
- Diabetes Empowerment

Human Performance Clinical Research Laboratory (HPCRL) at Colorado State University

- Heart Disease Prevention Program
- Performance Analysis

COVID-19 & NUTRITION

BY EMILY WOOLF, MS, NDTR & RAJ TRIKHA, MS

Due to the COVID-19 pandemic, good nutrition is now more important than ever, as consuming recommended amounts of micronutrients can help your body prevent and fight off infection. [2]. Additionally, we know that people who are most impacted by COVID-19 have underlying chronic diseases, such as obesity, which are provoked by poor nutrition. See Obesity and Inflammation for more information.

Understanding which foods to buy for optimal health during long periods of stay-at-home orders is important. Purchasing healthy and nutrient-dense food that won't expire quickly will allow you to minimize outings to the grocery store while still preparing healthful meals at home. Fresh fruits and vegetables provide the highest nutrient density to food mass, and currently there is no evidence suggesting that COVID-19 can be transmitted through foods [1,3]. However, it is good practice to wash your raw fruits and vegetables as soon as you get home, and always before cooking or eating them. Wiping off counters after putting groceries away is another good habit to adopt. Those who observe stay-at-home restrictions may find preserved foods convenient. Be aware that frozen fruits and vegetables provide comparable amounts of nutrients compared to fresh counterparts, and are able to be stored in the freezer up to a year [4].

While frozen meats do not last as long, they too, can be stored for up to six months in the freezer. Feel free to include dry beans and rice to go along with your produce, as these together make a complete protein and will help keep you full for longer.

Although pandemics might seem frightening, they have occurred throughout history and will continue to happen in the future. Regardless of why these events take place, it is important to understand how pandemics, such as the COVID-19 outbreak, affect your health outside of the virus. As such, following these recommendations in the grocery store and at home may allow you to easily produce an affordable and safe meal suited for any type of pandemic. However, if access to food is an issue for you, your family, or someone you may know, please contact the following resources for access to food:

- The Larimer County Food Bank
- Colorado Food Pantries
- Resource Hotline

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organized by article

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about the Gold Papers

From deep within the belly of the Food Science and Human Nutrition department at Colorado State University, came the idea for this project. A group of underachieving graduate students decided to clarify some of the confusion surrounding food and nutrition research while honing their scientific communication skills. The result of their efforts gave rise to the birth of the *Gold Papers* - a CSU flavored spinoff to White Papers, which aims to summarize current research and perspectives in their fields.

about us

Caitlin Clark is Ph.D student in Food Science at Colorado State University, where she previously also achieved her Master's. Her studies center on chocolate flavor and post-harvest processing. Caitlin hopes to pursue research and consulting for the small-batch chocolate industry to improve flavor consistency in high-end cacao beans. In her personal time, she experiments in her kitchen with anything that can be fermented.

Kayl Ecton is working toward her Doctoral degree in Cellular and Molecular Biology at Colorado State University. She aspires to complete an MD PhD and serve in the military. In her free time, she enjoys spending time with her family and reading.

Jessica Hill is working towards her Doctoral degree in Food Science and Human Nutrition at Colorado State University. Upon graduating this summer, she will start her postdoctoral training in their Biochemistry and Molecular Biology department where she aims to prepare for a career in academia. At her leisure, Jessica likes to spend time outside with her family and gardening.

Kara McIver is pursuing a Master's degree in Food Science and Human Nutrition with a focus on Community Nutrition. In the future, she plans to secure licensure as a Registered Dietitian, specializing in chronic disease prevention through diet and lifestyle. In her free time, she is a competitive CrossFit athlete and coach.

Raj Trikha graduated with his Master's of Science in Human Nutrition in May of 2020. He plans on pursuing medical school in hopes of working in academic medicine one day communicating the science of health to the general public. In his free time, Raj performs with a local improv team refining his craft of communication while trying, desperately, to make people laugh.

Emily Woolf is a first-year doctoral student pursuing a degree in Food Science and Human Nutrition. She is currently studying functional foods and human health, specifically cardiovascular health, with the hope that one day she will become a professor and principal investigator leading her own research. When she can, Emily loves to travel and be in nature.