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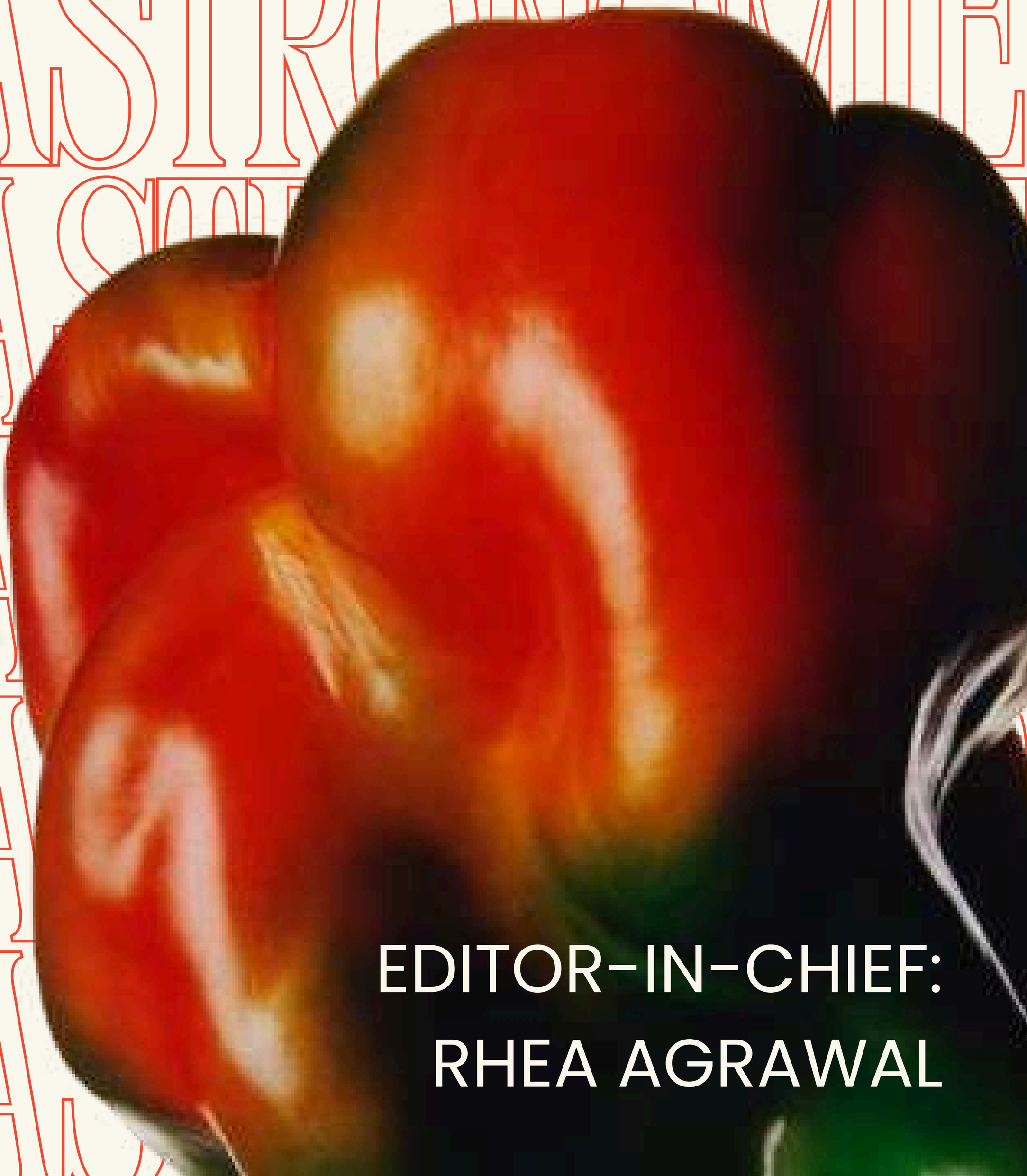

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THE SCIENCE BEHIND FLAVOR PAIRINGS

BY JOLEEN SADEK

Taste and Smell

Flavor perception (the way we experience food) relies heavily on smell rather than taste alone. Retronasal smell, which occurs when aromas travel from the mouth to the nose during chewing, plays a major role in forming what we experience as flavor (Small, 2012). Without this process, foods lose much of their complexity, making cheese taste one-dimensional and fruit dull (Edmund, 2025).

Role of Contrast

Pairings are not only about similarity but also about balance. Contrasting qualities, like salty with sweet, fatty with acidic, or spicy with cooling, create more dynamic experiences for the palate. Cultural food traditions worldwide highlight this principle, from chili with lime to ice cream paired with salty fries (Spence, 2015; Edmund, 2025). These contrasts prevent sensory fatigue (when your mouth gets “used” to a taste) and add complexity to meals overall.

Molecular Basis

Food pairing often works when ingredients share key chemical compounds (molecules that give food its flavor). Research shows that coffee and chocolate share pyrazines (aromatic molecules that give roasted and nutty qualities), while tomatoes and Parmesan cheese are rich in glutamates (the building blocks of savory, umami taste) (Ahn et al., 2011; Edmund, 2025). These molecular similarities form the scientific foundation for why certain combinations feel universally enjoyable and natural.

Neural Response

Flavor pairings also depend on the brain’s reward system (the network of brain structures that process pleasure and motivation). Dopamine release reinforces pleasurable combinations, particularly when the pairing offers novelty (something new or surprising) (Zatorre et al., 2007). Studies show that retronasal odors integrate strongly with taste processing, explaining why surprising blends, such as hot honey on pizza, are experienced as especially enjoyable (Small, 2012; Edmund, 2025). Pairings that shock the senses often succeed because the brain favors new and rewarding experiences.

THE SCIENCE BEHIND FLAVOR PAIRINGS

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Joleen Sadek

THE CHEMISTRY OF UMAMI: THE SCIENCE BEHIND SAVORY FAVOR

("The Chemistry of Flavor: How Molecules Create Taste in Your Food - the Petite Chef." The Petite Chef, Feb. 2024, petitechefs.com/chemistry-flavor-food-molecules-taste-perception-flavor-compounds-2/. Accessed 26 Sept. 2025.)

What Is Umami?

Umami is often called the "fifth taste," recognized as a savory or meaty flavor found in foods like mushrooms, tomatoes, soy sauce, Parmesan cheese, and aged meats. Unlike sweet or salty tastes, umami is primarily detected through glutamate, an amino acid, and nucleotides like inosinate (from meat) or guanylate (from mushrooms), which bind to specific taste receptors on the tongue (Zhao, 2003; Chaudhari & Roper, 2010). These molecules signal to the brain that a food is protein-rich, explaining why umami foods often feel rich and satisfying.

Aroma's Contribution to Umami

While glutamate triggers the basic savory taste, the complexity of umami-rich foods often comes from volatile aroma compounds. For instance, roasting meat or aging cheese produces Maillard reaction products—complex molecules that contribute to roasted, nutty, and savory aromas. These aroma molecules travel retronasally to olfactory receptors while chewing, creating a fuller perception of umami (Small, 2012). Without smell, umami tastes flatter and less intense, showing how taste and aroma work together to create richness.

Molecular Mechanisms

Glutamate activates metabotropic glutamate receptors (mGluRs) on taste receptor cells, triggering neural signals interpreted as savory. Nucleotides such as inosinate and guanylate act synergistically with glutamate, meaning their combined effect is greater than the sum of each individually. This synergy explains why adding Parmesan or a splash of soy sauce can dramatically enhance the savory depth of soups, sauces, or broths (Yamaguchi, 1998; Petite Chef, 2024).

Brain Integration and Reward

The brain integrates taste, smell, and texture to form the perception of umami. The gustatory cortex processes taste signals, while the orbitofrontal cortex combines them with aroma and texture information. This integration triggers dopamine release, reinforcing the pleasure of eating umami-rich foods (Spence, 2015). Interestingly, the presence of umami can also enhance the perception of saltiness and sweetness, subtly influencing overall flavor balance (Yamaguchi, 1998).

THE CHEMISTRY OF UMAMI: THE SCIENCE BEHIND SAVORY FAVOR

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WHAT IS TASTY?

BY Ewurabena Goodwin Crentsil

When you think of tasty, I bet you picture a big, juicy burger or perhaps a big heaping bowl of banku and orko, or a tastefully plated assortment of sushi. These are glaringly different flavour profiles, so what makes them all tasty? Have you ever wondered what makes food good?

What if I told you taste is a social construction, what is considered tasty is dependent on our cultures, socialisation and class.

CLASS AND CULINARY CAPITAL

Pierre Bourdieu's concept of cultural capital is relevant in examining the relationship between food and class. Bourdieu defines cultural capital as the social assets and resources which give individuals advantages in society. In the context of food, cultural capital manifests itself in various ways, for example:

Food knowledge | being familiar with different cuisines and flavour profiles and cooking techniques, this knowledge is being learnt through formal education, which is not always available to those in the working class

Dining Etiquette | understanding the rules of table manners, wine pairing and restaurant culture, and having access to these dining events constantly, which is impossible for members of the working class

The upper class, with their greater cultural capital, often have more access to exotic, gourmet cuisine, which stands as a status symbol. The ability to even consider this food "tasty" is something reserved for only the upper class. In contrast, working-class cultures often prioritise comfort food and traditional dishes, foods that feed the body and not the mind, prioritising easy accessibility and cheap prices.

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FOOD SOCIALIZATION

Taste is influenced heavily by our socialisation. Family, peers and media play a big part in how we perceive taste. Individuals are likely to believe that the foods we are made to believe are good taste good:

Family influences | our early influences on food are often influenced by our family and caregivers. When families present foods to children as tasty, children will become inclined to consider these foods as tasty.

Peer influences | peers have a large influence on individuals in what they wear, think and even eat. The people we share meals and food experiences with do affect what we think about the food.

Media influences | the media plays a huge role in shaping our attitudes towards food through agencies such as agenda-setting, telling us what we should think is tasty or not.

Exposure to certain foods and food cultures gives us the ideas we should think about the foods we eat. In conclusion, the phrase “this tastes good” has a whole lot more to do with sociology than you may think.

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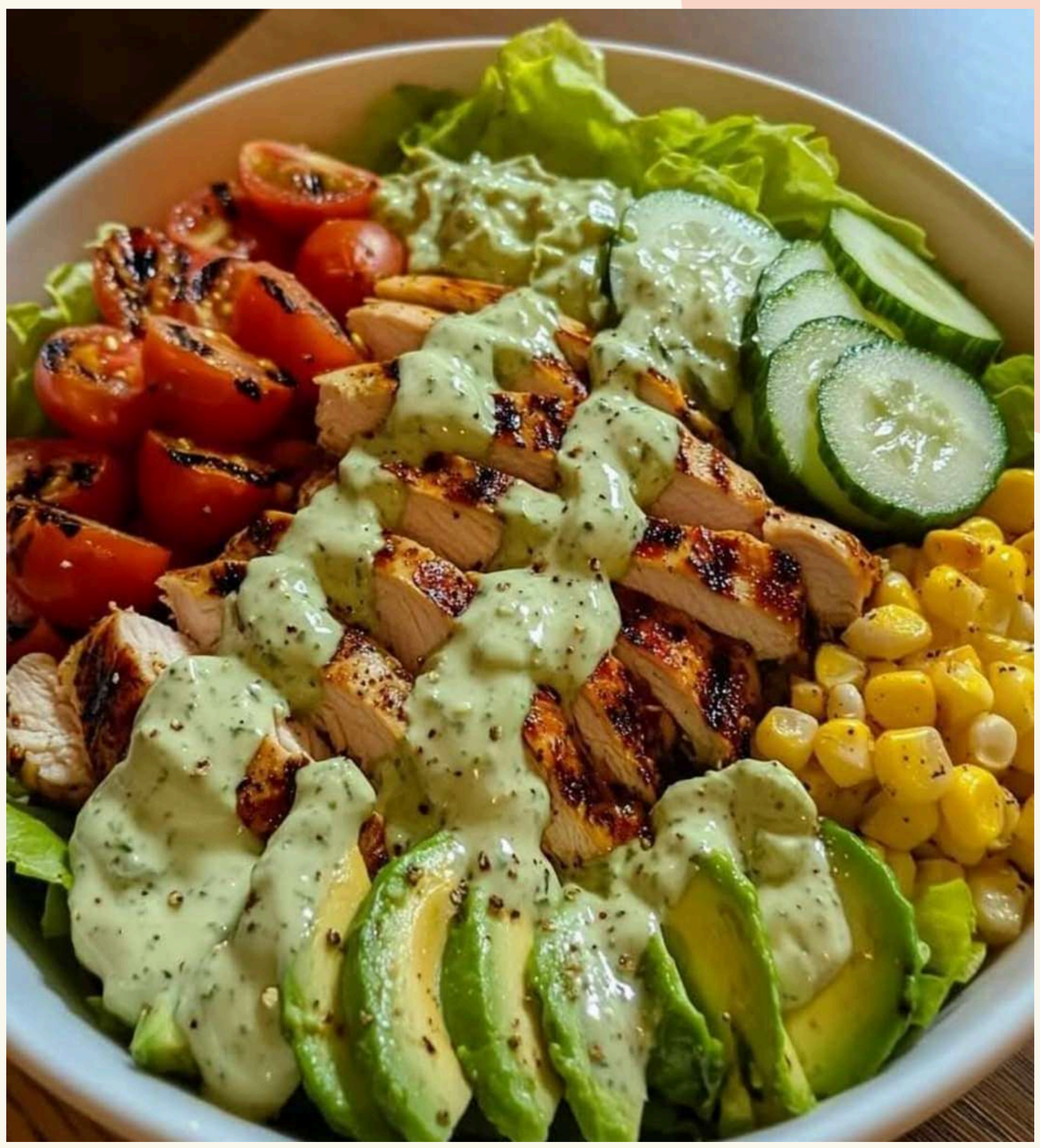

THE SCIENCE BEHIND COMFORT FOOD

BY: AVIKA GUPTA

THE SCIENCE BEHIND COMFORT FOOD IS A MIX OF NEUROBIOLOGY AND PSYCHOLOGY. SPECIFIC FOODS TRIGGER THE BRAIN'S REWARD SYSTEM THROUGH A DOPAMINE RELEASE, AND PSYCHOLOGICAL FACTORS LIKE STRESS, BOREDOM, AND NOSTALGIA LINK CERTAIN FOODS TO POSITIVITY. A COMFORT FOOD IS A FOOD THAT HELPS US FEEL BETTER AND LOWER STRESS/ANXIETY LEVELS. EVERYONE HAS A COMFORT FOOD, WHETHER IT'S A PACKET OF CHIPS, PIZZA, CANDIED FRUIT, OR ICE-CREAM.

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THE BRAIN IS SAID TO HAVE HEDONIC HOTSPOTS. THESE ARE SPECIFIC SUBREGIONS THAT HEIGHTEN THE PLEASURABLE SENSATION OR "LIKING" OF PLEASANT TASTES, SUCH AS CARBOHYDRATES, FATS, AND SALTS. THIS MAY CAUSE A DOPAMINE SPIKE, WHICH INCREASES THE DESIRE TO LOOK FOR AND EAT DELICIOUS FOOD REWARDS. COMFORT FOODS TEND TO WORK WELL FOR SHORT-TERM DOPAMINE SURGES. THE QUESTION IS, HOW DOES THIS REALLY WORK? MANY THEORIES STATE THAT COMFORT FOODS ARE RELATED TO PAST CELEBRATIONS, JOYOUS MEMORIES AND HAVE PAST-CONNECTIONS.

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COMFORT FOOD CAN MAKE US FEEL BETTER BY TRIGGERING THESE EMOTIONAL MEMORIES (CHILDHOOD MOMENTS, HOLIDAYS, MOMENTS OF CARE OR FEELING LOVED), THIS ALLOWS THE BRAIN TO CURATE A SENSE OF SAFETY AND FAMILIARITY. ANOTHER REASON FOR FEELING BETTER AFTER EATING COMFORT FOODS IS "BRAIN CHEMISTRY BOOST", COMFORT FOODS OFTEN CONTAIN SUGAR, FATS, OR CARBS. THESE STIMULATE THE RELEASE OF DOPAMINE AND SEROTONIN; THIS CAN ELEVATE ONE'S MOOD. THESE FOODS CAN MIMIC THE CALMING EFFECTS OF A HUG OR A WARM BLANKET, PROVIDING EXTREME CALM AND A SOOTHING EFFECT.

THE SCIENCE BEHIND SUGARS IN FOOD

BY: NISHIKA CHANDARANA

When we look at a nutrition label on different foods, like spaghetti sauce, granola, or a no added sugar drink, we can always see a row for ‘sugar’, which shows us the amount of sugar in the food. However, when looking at a ‘no added sugars’ food, we can usually see that there is still sugar in the food. The Question is this: If a food has no sugar added to it, then why does the nutrition label still show the presence of sugar?

Sugar is usually perceived as the white, crystalline or powdery substance that is added to dishes to make them sweeter. While this is true, there are many other kinds of sugars which are naturally present in your body and in many foods you eat.

In Biochemistry, simple sugars (made up of only 1 kind of sugar) are known as Monosaccharides. This is not the table sugar we consume, but it is rather the different sugars that make up the one we have in our households. There are 3 common Monosaccharides in food : Glucose, Fructose and Galactose. They are also known as dietary monosaccharides as they are easily absorbed in the digestive system and are present in the food we eat.

Glucose is a common form of sugar that is in the bloodstream of animals, including humans. It provides us with the energy

our cells need in order to perform basic cell functions and complex brain activity and thinking. The brain uses up half the body's total sugar energy to perform its functions. The glucose is either converted to a usable form of energy known as ATP or is stored as glycogen in the liver and muscles for later use, in case blood sugar drops. Hence, glucose is a very essential sugar for our body. All complex carbohydrates and sugars are broken down to glucose in the body.

Fructose naturally occurs in fruits, root crops, sugar cane and honey. It is also commercially used in corn syrup, where it becomes an added sugar. It is much sweeter than normal sugar, however, when consumed naturally(in whole foods) and in moderation, it does not have the same side effects as normal sugar, such as tooth decay or obesity.

Galactose does not naturally occur freely, meaning it is always naturally found as a constituent of another sugar, which is lactose. Lactose is a combination of Glucose and Galactose, which is why it is mainly found in dairy products, which contain lactose. It is also found on the surface of red blood cells as a component of the antigens that identify different blood groups.

Another type of sugars are Disaccharides. These sugars are made up of two monosaccharides, for example, lactose (Glucose and Galactose). They form chains with the other monosaccharide molecule. There are 3 common disaccharides in food : Sucrose, Lactose and Maltose.

Sucrose is the common table sugar we use in our households. Made up of Glucose + Fructose, It occurs naturally and is mass processed and produced to make the commercial sugar we buy in the market. It can be found in fruits, vegetables (like carrots and beetroot), sugar cane and sugar beets. It is common in processed foods like cookies, cakes, and soft drinks as well. Sucrose is not very good for your body in excess amounts as it is usually converted to fat in the body when the caloric intake exceeds the body requirements. It also causes tooth decay by promoting formation of plaque and obesity.

Lactose is the only sugar that naturally occurs in mammals. Other sugars, including glucose, are formed in plants, and when we eat them, we use the sugars in our body for it to function. Lactose is the sugar primarily found in milk and dairy products, often known as 'milk sugar'. It is made up of Galactose + Glucose, and is found in milk, cheese, butter, yoghurt and other dairy items.

Maltose, made up of Glucose + Glucose, occurs naturally in sprouted grains like barley and wheat, and is primarily produced in the breakdown of starch. It is also found in malted cereals, bread, energy bars, beer, and molasses. In the production of beer, maltose is liberated by germinating barley on starch, which is why it is referred to as ‘malt sugar’. Sucrose is about 3 times more sweet than maltos.
The molecules of maltose are too big for digestion and are hence broken down to glucose in the body.

Additionally, there are more complex structures which are made up of more than two monosaccharides. These are not termed as sugars but as carbohydrates.
Chains of 3 to 10 monosaccharides are known as Oligosaccharides, and complex carbohydrates made of long chains of more than 10 monosaccharides are known as Polysaccharides, such as starch and cellulose.

To conclude, sugars don't just refer to the simple table sugar that we eat. There are many different kinds of sugars naturally occurring in our food and body, with different levels of complexity and found in different sources, all-the-more promoting us to eat proper whole foods to ensure a balanced diet and better blood sugar levels.

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