

FEBRUARY 2016

GENERAL ISSUE

# BASIS INQUIRER

BASIS SCOTTSDALE SCIENCE  
MAGAZINE

## EDIBLE ARTWORK

Cooking and science. Two of mankind's greatest accomplishments.

## WHY THE FUTURE IS OURS TO MOLD

Neural prostheses and neural regeneration are becoming increasingly researched in the modern world.

## ARTIFICIAL FLAVORING

We all love candy, soda, and Starbucks. Why do they taste so good?

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# A LOOK INTO THE DIGESTIVE SYSTEM

## THE PROCESS

Points to Remember

- Digestion is important for breaking down food into nutrients, which the body uses for energy, growth, and cell repair.

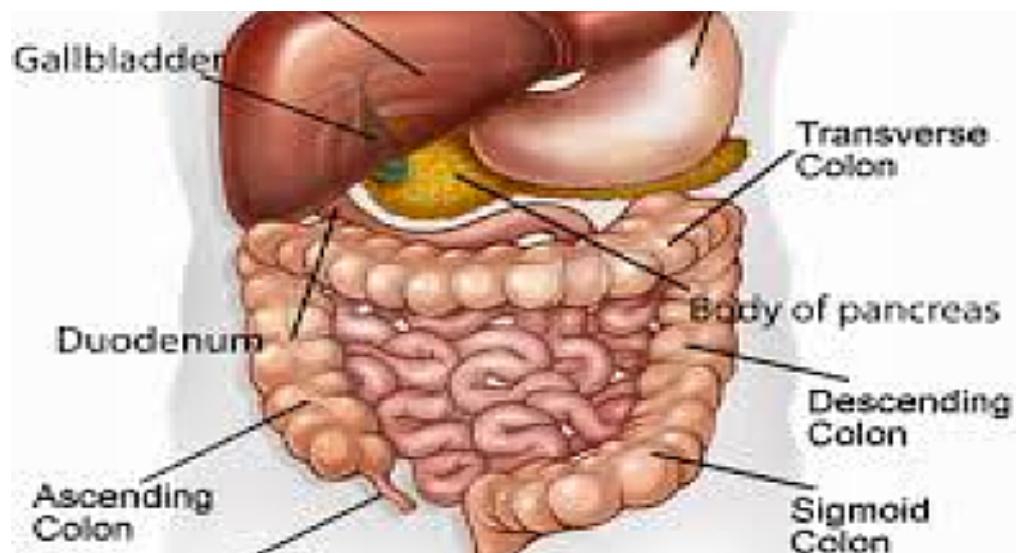
Digestion works by moving food through the gastrointestinal (GI) tract.

- Digestion begins in the mouth with chewing and ends in the small intestine.
- As food passes through the GI tract, it mixes with digestive juices, causing large molecules of food to break down into smaller molecules.
- The body then absorbs these smaller molecules through the walls of the small intestine into the bloodstream, which delivers them to the rest of the body.
- Digestive juices contain enzymes that break food down into different nutrients.
- The small intestine absorbs most digested food molecules, as well as water and minerals, and passes them on to other parts of the body for storage or further chemical change.
- Hormone and nerve regulators control the digestive process.



## SIGNIFICANCE

- Digestion is important for breaking down food into nutrients, which the body uses for energy, growth, and cell repair. Food and drink must be changed into smaller molecules of nutrients before the blood absorbs them and carries them to cells throughout the body.
- The body breaks down nutrients from food and drink into carbohydrates, protein, fats, and vitamins.



## INTRODUCTION

When we eat foods such as bread, meat, and vegetables, they are not in a form that the body can use as nourishment. Our food and drink must be changed into smaller molecules of nutrients before they can be absorbed into the blood and carried to cells throughout the body. Two solid organs, the liver and the pancreas, produce digestive juices that reach the intestine through small tubes. In addition, parts of other organ systems (for instance, nerves and blood) play a major role in the digestive system.

Digestion is the process by which food and drink are broken down into their smallest parts so that the body can use them to build and nourish cells and to provide energy. Digestion involves the mixing of food, its movement through the digestive tract, and the chemical breakdown of the large molecules of food into smaller molecules.



# *Edible Artwork*

UNDERSTANDING FOOD  
ON AN INTIMATE  
LEVEL

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By Alonzo Arambulo

Though the act of devouring things is a basic primal function performed by all motile organisms, humans have turned food into something much more. Through the invention of fire, hence, cooking, early humans gained access to far more calories in the same foods, and made raw ingredients easier to chew.

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As a result, with softer food and more energy available for thinking, the neanderthals developed smaller, less ape-like jaws and larger brains; combining food and heat may just have been the key to the development of the human race as we know it. Today, cooking is considered by many to be an art form, up there with painting and music. Cooking food is one of the great human arts. Taking a medley of ingredients and combining them in specific ways to produce an expression of one's self is not something to be taken lightly. Chefs have dedicated countless hours of their lives, learning the basics of cooking, from knife skills to pastry making, and toiling in steaming, stressful kitchens to perfect various cooking techniques, to serve people all kinds of food.

And it is not only the five star, high class, hundred-dollar-a-plate creations that are considered art. Anything made with heart and spirit is a true masterpiece on its own; few people realize and appreciate this. Regardless of how expensive their work is, cooks work their magic to produce an edible work of art out of a plethora of different ingredients just as painters blend colors together to delight the eye, as musicians string harmonious sounds together to please the ear, and as writers pull words together to entertain the mind. From all the components that make a dish up, to the specific temperatures and times and ways to combine things, everything about food screams artistry.





Pringles. Pumpkin Spice Latte. All unbelievably delicious food products, all unbelievably artificial. In the modern world we live in today, processed foods are becoming so common that every 7 out of 10 foods that we eat have some kind of artificial change (Lunchbox: How Processed Food Took Over the American Meal) Artificial flavors aren't necessarily bad, but it's quite worrying that such a high percentage of our daily calorie intake come from a food processing plant.

As made evident by its name, artificial flavoring requires the man-operated synthesis of materials and obviously does not come from Mother Nature. So, what's the whole point? What benefits do food companies gain by using artificially created chemicals to the foods we eat? To answer this, let's first take a look at how we taste and smell.

All kinds of chemicals are involved whenever we smell or taste. In a nutshell, chemicals from the foods and drinks we consume waft up into the sensory receptors in our nose, which then trigger signals that communicate with the brain. Regarding taste, substances from the food and drink passing over our taste buds trigger taste receptors on the tongue, which then send information about the substance to the brain. Thus, artificial flavoring is specifically tailored to the olfactory and gustatory senses in the nose and mouth, respectively, and often works even more effectively than natural flavoring! Thus, while we may not actually consume an authentic cinnamon latte, the chemicals in the drink work together to give our taste and smell receptors the illusion of the real thing!

# Artificial Flavoring

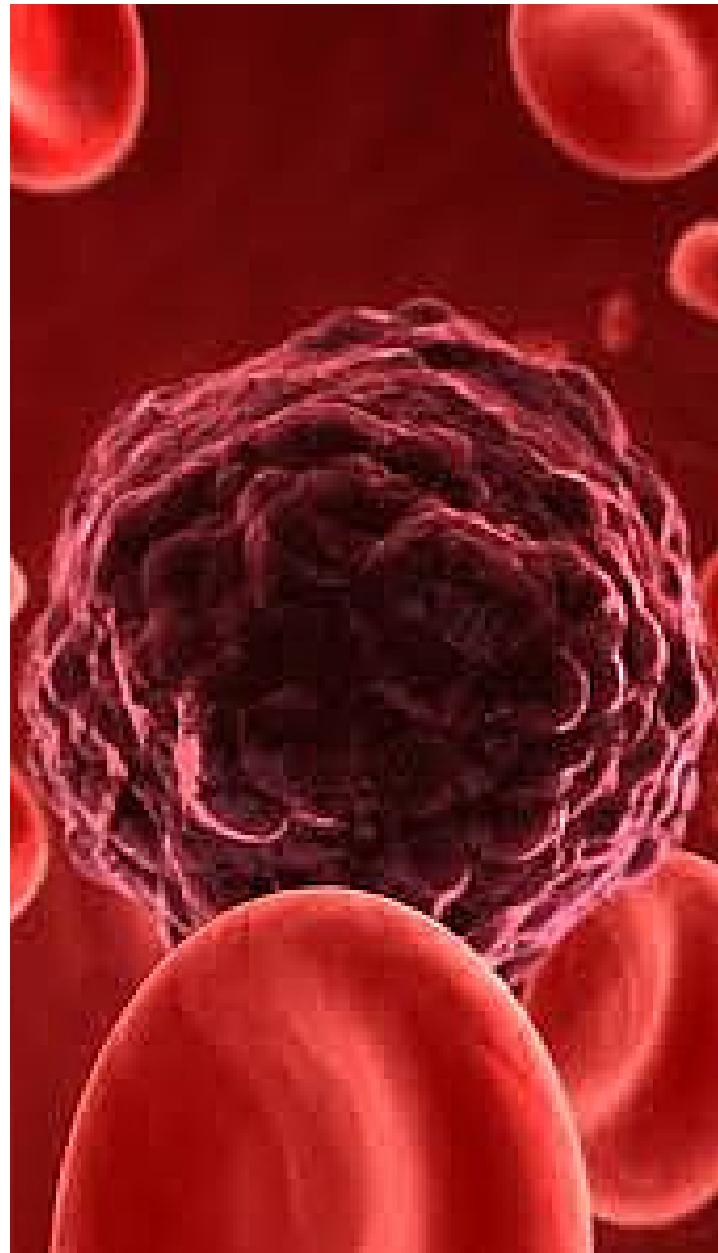
By Jerry Miao

Not surprisingly, artificial flavoring is usually not healthy or beneficial to the body. For example, aspartame, a non-saccharide artificial sweetener and sugar substitute, can cause a number of health problems, ranging from minor headaches all the way to epileptic seizures. While occasionally consuming foods with artificial ingredients is totally fine, going overboard with them could very well lead to some health problems. It may be a good idea to visit a farmer's market, such as Sprouts, as a way to obtain (usually) all-natural, healthy produce (don't feel too bad about the occasional junk food item).

# CANCER OF MICE AND MEN

By Rizwan Manan

Cancer has been a blight for hundreds of years. Yet unlike any other deadly plague, such as smallpox, it's never been eradicated, or even solved. Instead, more forms have been identified. Why is it that we can't simply come up with some medicine, some treatment, to cure it? The problem lies in Cancer's ability to mutate cells. Normal white blood cells target specific indicator molecules on a cell to destroy it. However the cancerous cells don't have those molecules, and the cells can't target them. However, through current research, scientists at the Wake Forest University Baptist medical centre may have a viable treatment. Using granulocytes, a type of white blood cell, in transfusions, researchers have cured mice with all kinds of cancer, many of which are in advanced stages. The plan for humans is as such; Young donors, under 50, will give healthy granulocytes to patients when their cancer killing ability is the highest. If this works, what will it mean for the numerous people afflicted with cancer? Unfortunately, for the start, many won't be able to have this done, because it costs a whopping 100,000 dollars. Most likely, the cost will decrease as it is performed and accepted more. And more. Whichever way, this is a foothold back into the fight against cancer.



# WHY THE FUTURE IS OURS TO MOLD

BY ARCHIT CHOPRA

## Neural prostheses

The future for neural prostheses will help epileptics, victims of Alzheimer's, and soldiers suffering from PTSD, among other possible uses in the psychological aspect. Yet that future is still quite far away as technology has yet to reach that level of advancement, in order to reach that level, engineers will be required to work with materials to create devices that will be able to withstand the human body, especially so they can survive in the body for an extended period of time. The prostheses work by exciting neurons to take over the work of dead neurons.

In Wake Forrest University, researchers developed a chip that can be inserted into the hippocampus and be used to help retain memory, being useful when treating retrograde amnesia. The hippocampus is a structure located in the temporal lobe, which mainly revolves around auditory functions of the brain, which is responsible for memory.

As for the previously mentioned issue of reliability, researchers have been working on creating a flexible polymer in order to combat the issue of rigidity, which have been known to cause micro-tearing. Although, the polymer's flexibility also brings up issues relating to implanting the polymer in the brain which is being bypassed through the use of bio-dissolvable polyethylene glycol (PEG).

The advancements in the field of neural prostheses are not to be taken lightly, as over five million people suffer from Alzheimers and an estimated 7.8 percent of americans experience PTSD at some point in their lives. These technological leaps will lead to a great improvement in the life quality of these people, causing these neural prostheses of the future to be a thing to look forward towards.

## Neural Regeneration

For a long time, it's always been known that the one thing that your body has been unable to replace has been neurons. Instead of taking an approach that neural prostheses have taken, overworking neurons to take over the work of dead neurons, neural regeneration works by utilizing the brains regeneration capabilities. Scientists have been using stem cells, cells which can regenerate and be transformed into a multitude of different types of cells, to reach the goal of neural regeneration.

Scientists at Johannes Gutenberg University have discovered a gene called NeuroD1 which triggers neurogenesis in adult brain cells, the gene GADD45b has also been found to trigger neural regeneration in some cases. For many years, scientists have been searching for ways to activate these genes but the route with the most success has been to activate a promoter called Brain Derived Neurotrophic Factor (BDNF). Surprisingly, the most effective form of activating BDNF has proven to be constantly exercising and maintaining low body weight.

All this has been based on research on adult brains, but as for young brains, the way to achieve neural regeneration has been to reverse the aging of the brain. Biologists at Cambridge University have discovered several techniques that seem to have the potential to reset the age clocks in our brains, gene therapies have already shown some success in preventing Alzheimer's.

The future for neural regeneration truly lies in DNA. Animals such as monkeys and even fruit flies share a large percentage of genes with us, and the secret to neural regeneration lies in them, which we must continue to search for.

# Palm Oil: More Dangerous than It Seems

LANDON JENKINS

Indonesia is the world's top producer of palm oil, a commodity found in your lipstick, your shampoo, your pizza, your chocolate. But few know the truth behind how palm oil is harvested, which involves a process that is deteriorating the planet. To create palm oil plantations, producers have to burn down anything in their way, as oil palms grow best in scorched soil with the nutrients of the dead trees. In moderation, the effects of the production are not too drastic, except Indonesian companies have completely abused this process. Deforestation there has lead to 3250 square miles of natural growing trees lost just recently in 2012, and the rate of deforestation there is greater there than in any other country. But how exactly does this affect the globe? Burning the peat in Indonesia leads to extremely high carbon emissions, which make up 82% of all greenhouse gases. On top of that, deforestation is responsible for 20% of global warming today. Without the original trees, storage of carbon and production of fresh oxygen is stunted, responsible for the climate change seen recently. And these are only the global effects. The immediate effects on Indonesia, Malaysia, and all of the wildlife is extremely harmful. Palls of suffocating smog cover nearby cities while the residents choke on the unbreathable air.

Orangutans, Sumatran tigers, Bornean Rhinoceroses, and elephants die because their habitats are burnt to the ground. The workers in the plantations beat orangutans to death, and burn them to death as well. Nearly 50,000 of these endangered apes have died in the past 20 years. And the overarching issue with this entire complex industry is the legality. None of it is legal. Peat burning was outlawed by the government yet private companies continue with their vandalism, with little opposition. A few local conservation efforts rescue orangutans at risk and destroy the companies' operational bases; however, worldwide recognition is extremely low, and a large scale movement is necessary until the face of the planet is changed forever.



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