

Epigenetic Scenarios

Directions: As you read the following scenarios, underline the environmental factors and lifestyle choices that led to the epigenetic results.

Mom's Pregnancy

Mom's Pregnancy Diet

Whole Food:

While the child's mom is pregnant, she takes on a whole food diet and is off the charts in healthiness. Her meals include: loads of fruits and veggies, whole grains, nonfat milk, lean proteins, foods low in sodium, seafood, and very few solid fats. During the day she drinks close to 64 fluid ounces of water. Result: the baby is born normal sized and with healthy organs.

Junk Food/Starvation:

While the child's mom is pregnant, she decides to throw all caution to the wind and eats whatever and whenever she wants. Ordering a large pizza, with all the toppings, in the middle of night and consuming it all by herself, all at one time, becomes the norm. That little snack is often followed by a pint of Ben and Jerry's, while watching Dr. Oz, in order to drown her sorrows. Result: the baby is born underweight with small organ and diabetes, but then becomes obese in childhood.

Mom's Stress During Pregnancy

Win the Lottery:

Every day on the way to work, the child's mom stops in at the corner market. She would pet the resident dog, grab a healthy sandwich for lunch, buy her two lottery tickets, and chat with the owner. And then on the day of each lottery drawing, her and her husband would listen diligently to the reading of each number. "Maybe today", they would whisper to each other. Miraculously that day came. After checking and rechecking, and rechecking again, they discovered that their bank account balance was about to have a few extra zeroes at the end. Suddenly, all financial worries of having a baby disappeared. Result: stress free pregnancy = healthy baby.

Job Loss:

While the child's mom is pregnant, she's a waitress at a local diner. She's a hard worker and well-liked by her customers. Unfortunately, much of her earnings relies on tips – which sometimes are few and far between. So when her husband is laid off from his job of over ten years due to downsizing, the stress begins. Month after month they are late on their rent, and every last penny is spent on food. She spends her days worried and anxious about the future. Result: baby is born underweight with malformed organs.

Child's Life Choices and Environment

Nutrition

Whole Food:

Early on, the child learns the importance of eating healthy whole foods. Meals for an average day often look like the following: breakfast - whole grain cereal with skim milk; lunch - grilled chicken, carrots, and an apple; dinner - vegetable stir fry with brown rice; and dessert - a slice of watermelon. Result: child maintains a healthy weight.

Junk Food:

Each and every day the child follows a very unhealthy eating routine. Breakfast is skipped in order to have time for the lengthy hair routine; lunch is a slice of cheese pizza, tater tots, and a bag of M&M's; dinner is whatever microwave meal is in the freezer; and dessert, eaten while doing homework, is a handful of Oreo cookies. Result: child is malnourished and has diabetes.

Smoking

Non-smoking Parents:

Neither of the child's parents smokes. In fact, they are very concerned about second hand smoke and so make an effort to keep their child away from smokers in public areas. Result: a healthy child with low vulnerability to developing asthma.

Parent smokes:

The child's father started smoking in high school and continues throughout adulthood. What started as a few cigarettes a day develops into a three pack a day habit. He smokes all through the house and in the car, even on cold days when all the windows are rolled up. Everything smells of smoke – clothes, furniture, and even the food. Result: the child's lifespan is shorter than average.

Air Quality

Country:

After college, the child moves to small town way out in the country – hundreds of miles from the nearest big city. Everything is close together, so everyone is able to bike or walk to everything. A vehicle of any sort on the road is as rare as a summer snowstorm. The air is fresh and the sky is clear. Result: the child has healthy lungs and is cancer free.

City:

After college, the child moves to one of the most polluted cities in the world – Mexico City. Pollutants are everywhere and from seemingly everything – cars, trucks, trains, buses, mopeds, planes, factories, and fires. While the job is good and the lifestyle fun, the child (now a young adult) one day finds that it is hard to breathe and visits a doctor. Result: the child develops lung cancer.

Sleep

Regular Work Schedule:

Each morning the child, now an adult, wakes up to the rising of the sun and the singing of the birds. An alarm clock goes off but the child's circadian rhythm does a much better job of announcing the morning. After an eight-hour day, the child returns home and is in bed by a reasonable time to get at least eight hours of sleep. Result: healthy.

Shift Work:

Every evening the child, now an adult, walks through the busy hallways of the local hospital to the pediatric wing to begin a twelve-hour shift as a pediatric nurse. Children are there due to fevers, food poisoning, stomachaches, and unknown illnesses. It is a hard but extremely rewarding job. Then, in the light of the following day, the child goes home to a darkened bedroom and tries to sleep. Result: due to a sleep schedule that is the opposite of human circadian rhythms the child develops breast cancer.

Exercise

Athlete:

As an adult, every morning the child wakes up, stretches, and goes for a jog. This is followed by a mellow bike ride to work. Weekends are reserved for long hikes with the dog or a game of tennis with friends. Throughout the child's life, regular exercise is a part of the routine. Result: healthy.

Couch Potato:

As an adult, the child has an office job that consists of sitting at a desk and working on a computer for hour after hour. After a long day, the child is too tired to exercise and so likes to go home, open a family size bag of chips and a few cans of Coke, and watch TV. First is all the entertainment news shows, then a few sitcoms, followed by a police crime show, and finally a late night talk show. Five hours later the child switches to playing video games and then climbs exhausted into bed at 2 a.m. Result: heart disease and depression.

Chronic Stress

Works at Disneyland:

Anytime an athlete wins a major sports event on TV, he or she lets the audience know about the plan to go to Disneyland. The child also decides to go to Disneyland, the happiest place on Earth, but to find a job. There the child wears a different Disney character outfit each day, sings and dances in the daily shows, marches in the parade, and interacts with happy families filled with giggling children. Every day is a joy. Result: healthy.

Air-Traffic Controller:

Hour after hour, day after day, the child watches the computer screen filled with dots and codes of numbers and letters. As an air traffic controller, the child is responsible for navigating planes through air space and making split-second decisions to avoid midair collisions. It is a mentally challenging job and incredibly stressful. Result: obesity, malnutrition, and hair loss.