

When last did you ponder on your body and how it functions? We hardly stop to think of how mysterious our bodies really are; however we have to. They're mysterious to the doctors as well and scientists that commit their lives to study them. The human body is hugely difficult and greatly strange, and it should make us wonder

In this book summary, you will learn about the components that structure all of us, from the brain and the heart to the thousands of species of microbes that stay both in and on us. Also, you will get to know about the vague role of sleep, the problems in dealing with a balanced diet, and the crucial role that hormones play in all things from regulating your sex-drive to producing feelings of affection.

## Chapter 1 - The human body is a really wonderful thing.

Assume that you had to create a human being from start. How would you do that? What building blocks would you require? How much would that cost you?

In 2013 the UK's Royal Society of Chemistry did the strange task of calculating the exact amount of building actor Benedict Cumberbatch. From their estimations, you'd require 59 various elements, but just six in any severe quantity – carbon, oxygen, hydrogen, nitrogen, calcium, and phosphorous. It would cost £96,546.79 for those elements - labor and taxes not part.

However, that's just one calculation. In 2012, an episode of the science program Nova, broadcast by US network PBS, set the amount of building a human at just \$168.

Although the amount of the materials for building a human body, as at then, is unclear –however, even with those entire materials, the exact act of building a human being would still be difficult to understand. All we'd hold would be a stack of inert elements. The wonder of life isn't a thing you can form basically by sticking stuff together.

As a matter of fact, we can't even proudly say where life starts. The cell is the vital life-giving unit that we all consist of. However, how precisely do cells manage themselves to form a

working human being? Till now, Science can't explain the complete story – which is marvelous in itself.

But, Science can tell us lots. Inside the nucleus of every cell, there is a meter of DNA. It consists of chromosomes and genes, DNA has the information required to form you. It's wonderful to reason that your DNA is the creation of generation after generation of transmission: the information embedded in your genes connects you straight to your ancestors of some three billion years ago.

Few people see the body as a machine; however, it's really mysterious and extraordinary than that. Constantly, it regularly goes for decades without requiring repairs, and all it requires to function is water and food. Also, it's conscious.

Another extraordinary thing to think of is that we originated through evolution, having begun as a few cells in the ocean. All the growths that humans have gone through since then have essentially been wonderful coincidences.

## Chapter 2 - We're not alone: every one of us has trillions of microbes, which we require to live.

Every one of us owes a debt of thanks to the countless microscopic things that stay inside us. Without them in us, we wouldn't only die, we would never have occurred initially.

You have trillions of trillions of microbes that stay inside you and on you. There are about 40 thousand various species, nine hundred of which live in just your nostrils.

Microbes are particularly essential when we talk of digestion: they provide 10% of our calories by breaking food down. Bacteria found in our gut and intestines release ten thousand digestive enzymes, while we alone release just 20. Our microbiota, as the total of our entire microbes is known, does a lot for us that they're basically like another organ.

However, our microbiota consists of more than only bacteria; also we have viruses. According to Dana Willner of San Diego State University, the average person has 174 microbiota and 90% of

these are perhaps unidentified. That's a frightening thought; however, from the hundreds of thousands of viruses that are present, thankfully just 263 of them are well-known to lead to disease in humans.

Also, our microbiota contains archaea, single-celled microorganisms that are related to bacteria; however, it never causes disease in humans; fungi, which overall have a bit effect on us; and protists, a group which very much contains every other microscopic organism. Though more than a million microbes have been known, just 1,415 of them are identified to cause harm to us. Not a bad ratio – even though those disease-causing microbes are still liable for a third of the entire human deaths.

Penicillin, the antibiotic has been helpful in the battle against the microbial disease. A fungus that is extraordinarily effective in killing off bacteria, penicillin was first made in mass in the US during the Second World War, when the golden-colored mold took out a cantaloupe shown to be particularly potent. Every penicillin used nowadays is gotten from the mold on that one melon.

Penicillin's skill in killing bacteria is a weakness as well, although: it kills off both good bacteria and bad, regularly to our harm. An even severe issue is that the more we use antibiotics, the less effective they turn out to be since bacteria develop resistance over time.

What makes this an actual issue is that antibiotics are really generally prescribed. An average person in the West gets antibiotics between five and 20 times before they become adults. In the US, they're even getting to farm animals in disturbing rates. This all adds to antibiotic resistance – an increasing threat, and a notice that we are entirely at the mercy of microbes.

## Chapter 3 - Your head has one of the greatest amazing things anywhere: that is your brain.

The whole body is remarkable; however, the brain is mainly remarkable. It's an exceptional structure, regardless of how you view it. It has 75–80 percent of water, strangely soft and permanently closed away from the outside world that it lets you realize.

Our brains are hard workers. The myth that we just utilize 10% of our brain's complete capacity at any point isn't correct: we use the entire thing. As a matter of fact, it uses up 20% of our entire energy – that percentage is 65% for a newborn baby,— still, it is very efficient, requiring just as many calories per day as the one you get from a blueberry muffin.

The brains of other animals, like dogs and hamsters, consists of the same constituents, and the size of ours is nothing exceptional either – truly speaking, they're the exact size with those of mice. However, the 86 billion or thereabout neurons it has created trillions of connections with each other, contributing to something relatively remarkable.

The brain is divided into three key parts: the cerebrum, which is the part divide into two hemispheres, and the place of everything from sensory processing to feelings and personality; the cerebellum found at the back of the head, which has over half of neurons in the brain and is in charge of balance and movement; and the brainstem, which links the brain to the spine and the remaining part of the body.

The brainstem controls important functions such as breathing and sleeping. We also have different kinds of smaller parts like the hypothalamus, a peanut-sized region that regulates the majority of our chemical workings and controls things such as sexual function, hunger, and thirst, even maybe how fast we age.

In the 19th century, some scientists believed that parts of our personality could be presumed from the size and shape of our heads. This causes the tricky disciplines of phrenology and craniometry. They were mistaken; however, it's still correct that our heads have some amazing attributes, even far from the brain. For beginners, our faces' ability for expressivity is amazingly extensive.

We can do thousands of various expressions; however, it's supposed that there are six that are common among every human; that is fear, anger, surprise, pleasure, disgust, and sorrow. Basically, everyone knows a true smile. It's not a thing we can fake as we're incapable to control the muscles that form it independently.

Also, our heads are where three main senses are founded: sight, hearing, and smell – all of which are processed by that extraordinary, tofu-like blob called the brain.

## Chapter 4 - Our knowledge of the heart and blood has gotten better; however, still has a lot to go.

We've got the heart totally mistaken. It isn't in the spot where we think it is, on the left-hand side of the chest – it's more towards the middle. Also, it doesn't have the shape of the normal symbol that signifies it. Also, it's not actually a very romantic kind of organ whatsoever and doesn't have anything to do with our feelings. Also, seeing it has such a singular and vital job to do: to push blood all around bodies. Our hearts will get through 3.5 billion beats in our lifespans.

Since it has a weight that is less than a pound, it's extraordinary that it succeeds to do this. Your blood needs to travel as far as four feet or thereabout, down to your feet and back up again, going against the pull of gravity. The powerful pushes of the heart distribute roughly 260 liters of blood per hour.

Blood itself does a lot of duties: it takes oxygen to the cells, transports chemicals all around, removes waste, kills pathogens, and helps control our temperature. It's difficult, complex stuff – which is the reason why a blood test can tell doctors a lot.

The four key elements of blood are plasma, red and white blood cells, and platelets. Plasma, the most abundant element, is 90% water and has different chemicals. The ones that carry oxygen around the body are the Red blood cells. White blood cells are important in fighting infections. For over a long period of time, platelets were a mystery; however, we now understand that they help in blood clotting and current research has revealed they also assist in other aspects like regenerating tissue.

Formerly, the treatment of blood was symbolic of how mistaken doctors could be. For centuries, bloodletting was seen as a normal medical procedure. George Washington was only one of the people whereby the procedure possibly did more harm than good. The illness that caused his death is assumed to have been a throat infection, still, doctors took out 40% of his blood over two days.

Medicine has progressed since then. Now, we are able to transfuse blood, though the process is still complicated, and keeping blood isn't easy as well. Doctors are attempting to make artificial blood, and while they have only made a small success so far, a lot of us are positive that nanotechnology will help. Although, for now, the heart will continue to pump an element the world's greatest minds can't reproduce.

## Chapter 5 - Hormones are essential; yet strange chemicals produced within the body.

Hormones carry chemical messages around the body. They're a varied group; however, they can be widely defined as anything made in one part of the body that makes something to occur in another part. Partially because of their variety, it's relatively lately that scientists have begun to concentrate on them. Since 1958, the amount of identified hormones has increased from nearly 20 to a minimum of 80.

Nothing demonstrates the significance of hormones more than diabetes. Diabetics are incapable to form enough insulin, the hormone that controls the quantity of sugar that is in our blood. As late as the 1920s, diabetes was effectively a death verdict: without insulin, sugar levels would only keep increasing, which would ultimately lead to death. The only protection was to stop food consumption.

When scientists ultimately succeeded to make insulin themselves, the results were miraculous: diabetics were nearly instantly restored to full health. Michael Bliss who is the author of the book named *The Discovery of Insulin* has named it as close to the resurrection as medicine has ever come.

The tallest person that ever lived gives another enlightening hormone-related story. Robert Wadlow, of Alton, Illinois, was more than eight feet tall when he finished high school in 1936, and he continues getting taller after that. What was the reason? An issue in his pituitary gland – a small gland in the brain, the size of a baked bean – signified that he released a lot of growth hormone. Wadlow died at a young age of 22 after an infection became septic – he got it due to

the leg braces he was obliged to wear due to his height. He was eight feet eleven inches tall when he died.

It's amazing that such a small gland could have huge effects on the body. However, we know what had occurred with Robert Wadlow. Many of what hormones do, and the reason, is still a mystery. For example, Oxytocin, sometimes called the "hug hormone" as it assists produce feelings of affection. However, for causes that are unknown, it also causes the contractions of the uterus when mothers give birth, and in facial recognition. Why this grouping of responsibilities? What links them? The body has a lot of secrets it's yet to reveal.

## Chapter 6 - Humans have developed an exceptionally flexible structure that enables us to walk on two feet.

How many bones do you possess? Roughly 206; however, it really differs: for example, one in eight people has the thirteenth pair of ribs. Also, there are the sesamoid bones that are shaped like sesame-seeds, typically really small and can be seen in our hands, feet, and elsewhere. They're not part of that estimation.

Therefore, what do these entire bones do? They do more than only hold us together, that's definite. Bones give us protection, make blood cells and keep chemicals. During the early 2000s, it was found out that they even produce a hormone known as osteocalcin. Incidentally, this may describe why steady exercise, which makes the bones stronger, also helps to decrease the risk of having Alzheimer's disease.

The manner in which bones, muscles, and tendons all link together is remarkable in its elegance. Sir Charles Bell the nineteenth-century Scottish surgeon was really captivated by this that he even named the hand proof of divine creation. Hands have 29 bones, 17 muscles, 123 known ligaments, and various arteries and nerves, and there are another 18 muscles found in the forearm that regulates them.

What it causes is something exceptionally flexible. Our opposable thumbs get more praise; however, the fact is that the majority of the primates have them. What's really unique to humans

is a trio of muscles in our thumbs that allow us to use tools very effectively. Although, they are not really known, though: few people have heard of the extensor pollicis brevis, flexor pollicis longus, and first volar interosseous of Henle.

Also, we are unique among primates since we are bipedal: this may be as significant as a component of what makes us human as our brain. Walking upright has signified that we've had to evolve in some really certain manners, with longer necks, suppler backs, and bigger knees than other primates. Although, things still do go bad, as the numerous sufferers of long-lasting back pain will tell you. Also, walking upright is the cause of why women developed to have a narrower pelvis, making childbirth really painful and risky. The severe pain of childbirth is something else that makes humans exceptional.

For a lot of our evolutionary history, we were hunter-gatherers, that is, getting food used up much energy. That is the reason we evolved to be really good at moving around. It's something to think of as we go back onto the couch: we are made for movement. With that being said, rest has continuously been significant; for one thing, you can't digest food when you're exercising. Therefore, you shouldn't feel really bad while you switch on the TV.

## Chapter 7 - You are basically what you consume— and that contains all that sugar.

Cooking is beyond a common pastime. It's also one of the key things that make us different from other primates. Cooking makes our food soft and is the cause we've developed smaller teeth and a relatively weak jaw. Also, it kills toxins, makes food taste better, and frees up time that we'd used to chew. Furthermore, it enables us to get more energy from food.

However, eating isn't only about getting energy. We also have to consume vitamins and minerals. Vitamins are derived in living things such as plants or animals, and minerals in inorganic things such as soil and water. Essentially, they're chemicals that we require but can't produce ourselves.



We are all aware that we require carbohydrates, proteins, and fats; however, what quantity of each is a contentious question. All dietary studies are flawed to some extent since everybody eats a different combination of foods and no two people have the exact same lifestyle. It's hard to choose the exact causes when there are really a lot of factors in play.

One of the few convictions in dietary science is that we consume a lot of sugar. An average American consumes 22 teaspoons of added sugar per day, even though the World Health Organization's suggested upper limit is five. The odds are against us, in a manner, and not only because of our fast-food culture. Fruits have also become more sugary over the years since the manufacturers have purposely made it sweeter.

Where does this entire food go to once we consume it? It uses a few hours swimming in hydrochloric acid in the stomach, which is the reason we don't regularly get sick from the food we eat – the acid kills off any potentially detrimental microbes. Afterward, the food goes down to the intestines – the small intestine first and then the large one. The entire nutrients are absorbed there, and bacteria break down the fiber.

Food that can't be utilized is excreted as feces. An average person releases 14,000 pounds throughout a lifetime. Feces essentially consists of dead bacteria, undigested fiber, and little dead cells from the intestines and blood. That's the only thing left. The body is very good at making what we eat to use.

## Chapter 8 - Our body monitors the time of day; therefore; it can let us know when to sleep.

No one knows the reason why sleep is really essential. Still, averagely, it takes up a third of our lives.

Sleep appears to do many things for the body: it's a kind of reset for memories, hormones, the immune system, and many more. However, what is the reason why we need to lose consciousness while the body does this? It's still not clear; but, there must be a cause. As Allan

Rechtschaffen a sleep researcher indicated, either sleep does something really essential, or it's an evolutionary error of really unique extents.

A lot of processes in us help us understand when it's time to sleep. As lately as 1999, it was found out that there's a third type of photoreceptor cell in our eyes together with the rods and cones we've understood for a long time that allow us to see. This third type – photosensitive retinal ganglion cells – senses brightness, making you aware of when it's during the day and when it's night. These cells signify that even some blind people can know if a light is on or off.

Also, we are now learning that our body is full of internal, circadian clocks – chemical mechanisms that react to the time of day – which stay in organs from the pancreas to the kidneys. Several circadian cycles have their own specific schedules: one such cycle, for instance, suggests that our reflexes are best in the middle of the afternoon.

But, our bodies don't only monitor the days. All thanks to the small pineal gland found in the middle of our brains, they monitor the seasons as well, similar to hibernating animals. Our bodies work in a bit different manners depending on the season. Take for instance; our hair grows faster in the summer.

Also, we're not alone in having internal clocks—bacteria have them as well. Russell Foster, the scientist who found the new photoreceptor cells, guesses that this may basically be one of the things that explain life.

Also, Humans have different circadian cycles at different phases of our lives, too, which clarify the reason why newborn babies require as much as 19 hours of sleep per day. The amount of sleep we require reduces with age, and that is the reason why young adults require more sleep than their parents. This difference in body clocks signifies that teenagers aren't basically being lazy when they find it difficult to wake up in the morning.

Chapter 9 - Medical research on women are still behind, and the research on childbirth is still in its early stages.

Gender science is new growth. The Y chromosome, the companion to the X chromosome that males have but females don't have, was only found in 1905. Unluckily, Nettie Stevens who was the female scientist who discovered it doesn't get any recognition for it because a man also found out about it at nearly the same time.

Another demonstration of sexism in science is the fact that women have been less studied than men. Until lately, a lot of drug trials left out women should in case their menstrual cycles occurred to twist effects—yet liable for the menstrual cycle is essential, as it's a likely factor in the reason why some drugs affect women in a different way than men.

For centuries, menstruation and menopause were basically not studied. Also, Female anatomy has been under-researched, as the continuing debate about the existence of the G spot demonstrates. A lot is understood about the male anatomy, though there are still some mysteries, like average penis size: various studies have created widely opposing results.

Also, there is still very much to know about pregnancy and childbirth. For example, the placenta is sometimes known as our least understood organ; however, it's an extremely active part of growth, removing toxins, distributing hormones, and killing anything that might be detrimental to the fetus. The majority of the issues in pregnancy occur from the placenta rather than the fetus.

Childbirth itself is really strange as to be miraculous. It's not really clear on what causes it; however, unexpectedly the amniotic fluid in the womb drains away and the baby's heart and lungs begin to function on their own. Definitely, for the mother, it is an incredibly painful situation; averagely, the newborn's head is an inch wider than the mother's birth canal.

Although, that passage through the birth canal, may have long-term effects on the baby – again thanks to the microbes, which transfer to the baby from the birth canal. Research on this is still growing; however; it appears that babies born through Cesarean section –those that don't go through the birth canal – end up with a higher chance of having health conditions such as Type 1 diabetes and asthma. That exact first contact with the mother's microbes may make an important difference; however, it's still another part where we really have a lot to learn about our bodies.

## Chapter 10 - We're succeeding in the battle against communicable diseases – however, in its place other diseases will claim us.

2011 was a prominent year in the history of the disease. That was the first time ever that there were more deaths caused by non-communicable diseases – those are diseases that can't be transmitted from humans to humans, diseases such as heart failure and strokes – than from communicable ones, such as viruses. This indicated the development in medical science; however, it also indicated the increased role our lifestyles have in our deaths.

A lot of communicable diseases were lethal until new times. In the West, we have effectively reduced a lot of these – for instance, in the US, diphtheria once killed 15 thousand people in a year; however, presently vanishingly rare –however, have just made one disease extinct. Thankfully, that was smallpox, perhaps the worst disease humans have ever encountered because of its widespread infectiousness – only in the 20<sup>th</sup> century, it killed about 500 million people before being officially stated to be eradicated in 1980.

About seven thousand genetic diseases are known which are non-communicable. A lot of them are really rare, like as pycnodysostosis, which the artist Henri de Toulouse-Lautrec suffered from, preventing the growth of his legs when he got to puberty; there have just been about 200 known cases of this condition. Rare conditions like this get really little research focus and so have no effective treatments.

According to Professor Daniel Lieberman of Harvard University, another group of diseases is called mismatch diseases. These diseases are caused by the difference between our modern lifestyles and the original hunter-gatherer purposes for which the human body developed. Examples of such are the rise of Type 2 diabetes and cardiovascular disease. We could prevent the majority of them through lifestyle choices.

Possibly our extreme fear presently is cancer, caused by cells that begin to divide uncontrollably. Meaning, cancer is the body attacking itself. The reasons for that are different, though the risk increases with increased age and with specific behaviors such as smoking,

extreme alcohol intake, and excessive eating. Although treatment is improving constantly, there's still really a long way to go.

Cancer causes pain as well; however, this mostly happens later in its development, well after the moment at which it might have helpfully informed us of the presence of cancer. Patrick Wall the Neuroscientist named cancer pain "the apogee of pointlessness," a key illustration of how chronic pain, such as cancer itself, is basically a case of the body malfunctioning. While acute pain fulfills a purpose in notifying us to danger, chronic pain is basically a fault in the system. Marvelous as they are, our bodies don't get it right every time.

## Chapter 11 - We've improved at avoiding death; however, it comes for everyone one of us.

Generally, since the turn of the 20th century, medicine has made amazing growth. According to Lawrence Henderson a Harvard physiologist, at a point between 1900 and 1912, a patient's probabilities of having something beneficial out of a visit to the doctor unexpectedly increased above 50% for the first time. It's only improved from there.

Although, it's not only medicine that has gotten better, as Thomas McKeown, the British epidemiologist hypothesized in the 1960s. He understood that, since the 19th century, there had been a reduction in deaths caused by a lot of diseases, as well as tuberculosis and measles, even before there were effective treatments for them. The cause for this was everything else that had gotten better in life: better sanitation, better diet, and even the railways, which signified that food could get to cities much fresher.

But, staving off death is just ever temporary. It's still not clear on the reason why we age; however, we all age and no one can go on living on for life. Definitely, how long we live differs extremely. Lieberman claims that it's likely to get to the age of 80 if you lived a healthy lifestyle; however, your chance of living more than that boils down to your genes.

There's a dispute on what kind of age young people today might try to get. Some people believe that we might normally see people living 50% longer than now, and some people think it's

possible to get to a thousand years old. Although, we're not close to that yet. Nowadays, just one in ten thousand survives to be a hundred.

There are about 60 million deaths each year – about 0.7 per hundred people. A fifth of these deaths are unexpected, and another fifth are at short notice. All the other deaths are relatively slow, as conditions slowly deteriorate.

Death itself is easy to identify – even for those that have never seen a dead body before.

Corpses are, particularly, still alive: the human may be dead; however, a lot of the microbes inside them stay. However, still, the body's own journey of life, filled with the miracle of human consciousness, is finished.

## The Body: A Guide for Occupants by Bill Bryson Book Review

Science can tell us remarkable things about the human body; however, one of the most remarkable is how many mysteries are still there. There's a lot to learn about how the body operates and how we should handle it; however, it's also valuable to basically remember just how incredible it is that we exist at all.

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