What is sleep? Why do we need it? How does our environment today affect sleep?

Introduction

The quality of our lives, what we eat, how we work and how we sleep, are thought to be closely linked. In the world today, many of people spend huge amounts of time and money going to the gym and buying endless amounts of supplements to aid our physical bodies. Most people know that they aren't getting enough sleep, in fact, 70% of us think we should be going to bed earlier, yet only now have we realised how dangerous a lack of sleep can really be.[1] This years Nobel Prize in medicine was awarded to three scientists who spent their lives researching sleep; Jeffery C. Hall, Michael Rosebash, and Michael W. Young. They discovered the genes that control the circadian rhythm, also known as the body clock.

Over decades of genetic research, the scientists used fruit flies to identify and isolate a gene named *period*, that controls the rhythm of a living organisms daily life. The gene seemed to control the circadian rhythm; when it was mutated the flies lost that rhythm. After examining the internal workings of the flies, investigators determined that the gene they were analysing encoded a protein that during night would accumulate in cells, and would then degrade during the day. The researchers understood this protein, which was called PER, in some way blocked the period gene during the day and was broken down. Then once again the gene would regain function for the night, directing the synthesis of PER. This entire system of processes also involved several other proteins necessary for the accumulation of PER. One that attaches to PER and helps it block the period gene, and another that slows the growth and build-up of the protein.
"The circadian system has its tentacles around everything", said Rosbash, and because everything on our Earth is affected by the Sun, the circadian rhythm is "ticking away in almost every tissue in the human body."

Through their efforts, the three scientists were "able to peek inside our biological clock," thus being able to "explain how plants, animals and humans adapt their biological rhythm so that it is synchronised with the Earth's revolutions," said the Nobel Prize committee. Critical functions such as hormone levels, behaviour, sleep, body temperature and metabolism are regulated by the body clock. Therefore, humans and all organisms operate on 24-hour rhythms that control not just wakefulness and sleep but also blood pressure and heart rate. The discoveries were pivotal. The continued misalignment between a person's lifestyle and the natural rhythm that was dictated by an inner timekeeper could dramatically affect human well-being over time, potentially putting us at risk of various diseases. Suddenly, the way we live, and not just how much we sleep, but the light we use, the jet lag we struggle with, and shift work that is just part of our job, might actually do more damage than we thought.

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1 https://www.thetimes.co.uk/article/lack-of-sleep-will-implode-your-immune-system-gzqjmrw9g, Weekend I The Times & The Sunday Times, 'Lack of sleep will implode your immune system', September 30, 2017, Accessed November 15, 2017

Sleep Through Time

We can see through time how our opinions on sleep have changed over time. Shakespeare once said, "O sleep o gentle sleep, nature's soft nurse, how have I frightened thee?". Thomas Dekker, an Elizabethan dramatist also wrote, "Sleep is the golden chain that ties health and our bodies together". To change things, 400 years later, Thomas Edison said, "Sleep is a criminal waste of time and a heritage from our cave days". It is interesting that we now religiously use his lightbulb to invade the dark of night. Using artificial light has recently been argued to negatively impact our sleep patterns and quality of sleep. Natural sunlight is a necessity, causing the skin to produce vitamin D3, a pro hormone that is vital for calcium to be absorbed into the body, aiding the development of healthy bones and proper muscle function.[2] As our internal clocks are regulated by light, the exposure to darkness or light (whether it be natural or not) triggers the release of different neurones in our brain that dictate how awake or sleepy we feel. So, if we are exposed to bright lights before preparing to sleep, it is likely to effect the production of the hormone melatonin that causes sleep. Equally when our loud alarms go off, many of us force ourselves to wake up in a dark room instead of using the natural rising sun to cause the ceasing of melatonin which is locking us in a sleepy state. With that in mind, we can look at how many people around the world use artificial light day in day out, and compare that to the number of people that have troubles with sleep quality and quantity. (See 'Sleep Deprivation' and Figure 6)

During the 1980's Margaret Thatcher was overheard saying, "Sleep is for wimps." Gordon Gekko a character in the film *Wall Street,* said: "Money never sleeps". That last line in particular seems to have been taken very literally in some parts of the world, where the importance of business and money is the centre of life. Subsequently, many people now live in denial that their sleep will, or is affecting their health. Instead they rely on stimulants such as caffeine or nicotine. Later, as caffeine can be described as 'blind to the reality of dusk and night time', people feel the need to use alcohol as a sedative. But sleep that occurs after sedation from alcohol is sedated sleep, and will not proceed through the healthy stages of sleep.[3] (See 'The Sleep Stages')

Many sources say that 8 hours of sleep is good, while 7 is not adequate and 5-6 hours, which is the amount many of us get, can negatively impact our reaction speed, ability to focus, thought processing and spatial orientation.[4]

"People in high-stake environments are held accountable for their actions when they are fatigued just like everyone else,"…"However, we now know that when someone is sleep-

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2https://www.healthstatus.com/health_blog/wellness/artificial-light-and-health/, HealthStatus, Artificial Light And Health, January 11, 2017, Accessed November 15, 2017

3https://www.ted.com/talks/jessa_gamble_how_to_sleep/transcript, Jessa Gamble: Our natural sleep cycle is nothing like what we do now | TED Talk, Our natural sleep cycle is nothing like what we do now, Accessed November 07, 2017

4https://www.helpguide.org/articles/sleep/sleep-needs-get-the-sleep-you-need.htm, Sleep Needs: What to Do If You're Not Getting Enough Sleep, Sleep Needs, Accessed November 07, 2017

deprived their brain simply can't process feedback from their actions and changing circumstances."[5]
"Our findings tell us that putting sleep-deprived people in perilous environments is an inherently risky business and raises a number of medical, legal and financial implications,".[6]

Although the correct 8 hours of sleep is information available to the public , millions of us still work early into the morning, our eyes staring at the bright screens of our phones and laptops, treating sleep like a burden that we HAVE to tolerate our need for. 36% of an average persons life is spent asleep, so if you live to 90, 32 of those years will have been spent asleep. We make our babies and children sleep so they can develop and grow. If everyone needs to sleep, what happens during our sleep that is so important? Along with the quantity of sleep, we must not forget the importance of quality sleep. How do we prepare ourselves before bed? Are our bedrooms 'sleep havens'? Are we allowing our bodies and brains to really do the work they need to so that we can be healthy and functional? Without sleep, we know that rats die within 2-3 weeks, the same time it takes humans to die from starvation. We also know as children become teenagers, the schedule of melatonin (a sleep promoting hormone) release during the night is delayed, which causes later sleeping and waking times. Are we supporting teenagers through this, or assuming they are just being lazy? At the moment, only 15% of children and teenagers are getting the correct amount of sleep.[7]

The Sleep Stages

There are 5 known stages of sleep, they include stages 1-4, which are non-REM sleep, and lastly stage 5, REM sleep, (rapid eye movement). During sleep, the stages progress from 1 through to 5 and then back to 1. These stages have been distinguished by changes in the electrical activity in the brain, measured by electroencephalogram (EEG). On average, a complete cycle takes 90 to 120 minutes, each stage lasting between 5 to 15 minutes. Typically, a person will go through 4 to 5 cycles during a night. The first cycles have relatively short REM sleeps and long periods of deeper sleep, but later into the night, REM periods become longer while deep sleep time deceases. [8]

Stage 1 is fairly light sleep, one may drift in and out of sleep and can be awakened easily. Eyes will move slowly and muscle activity becomes calmer, the brain also produces theta waves. Brain waves are made by synchronised electrical pulses, they come from numbers of neurones that communicate with each other. One can think of brainwaves as musical notes-those with a low frequency are similar to deeply

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[5]https://news.wsu.edu/2015/05/07/research-shows-sleep-loss-impedes-decision-making-in-crisis/, WSU News, Research shows sleep loss impedes decision making in crisis | WSU News | Washington State University, May 07, 2015, Accessed November 15, 2017

[6]https://news.wsu.edu/2015/05/07/research-shows-sleep-loss-impedes-decision-making-in-crisis/

7 https://www.medicinenet.com/script/main/art.asp?articlekey=15417, MedicineNet, Health Tip: Most Teens Don't Get Enough Sleep, Accessed November 15, 2017

[8]https://www.tuck.com/stages/, Tuck Sleep, Stages of Sleep - Non-REM and REM Sleep Cycles, Accessed November 07, 2017

penetrating drum beats, while higher frequency waves are like a subtle hight pitched flute. The higher and lower frequency waves can link and cohere with each other like a symphony.[9] Sometimes during stage 1 some people may experience sudden muscle contractions caused by a sensation of falling, also known as hypnic jerks. Hypnagogic hallucinations can also occur, such as feeling like you're still on a rocking on a boat from earlier that day. During stage 2, eye movement stops while brain waves become slower. Only occasional bursts of rapid brain theta waves will occur. As the body prepares for deep sleep, the heart rate slows and body temperature starts to drop. In stage 3, very slow brain waves called delta waves are interspersed with faster and smaller waves. The body is now in deep sleep, a time in which a person may experience night terrors, sleep walking, bedwetting, and talking. These behaviours are called parasomnias and tend to take place in the transitions of non-REM and REM sleep. When entering stage 4, deep sleep will continue as the brain produces almost exclusively delta waves. When woken during this stage people may often feel disorientated for a few moments. Breathing will also become slow and rhythmic, at this point many people begin to snore. During REM sleep, the eyes remain closed but move rapidly from side to side. The body is temporarily paralysed, muscles do not move at all except for breathing and eye movement. It is thought the rapid eye movement is related to the intense dreaming and brain activity taking place during this stage. As your brain becomes more active during deep and REM sleep, it processes things you have learned from the day, helping create memories. Growth hormone (GH or somatropin) is secreted in the pituitary gland by anterior pituitary cells called somatotrophs and begins the process of restoring cells, muscles and the immune system. Everything we burn up during the day we replace and restore as we sleep. During puberty in teenagers, it is highly important that the correct amount of GH is released so that healthy development can take place.

Many scientists believe the relationship between sleep and memory consolidation to be significant in our abilities to work well and can enhance our ability to come up with novel solutions to complex problems.[10] Scientists argue that REM sleep gives our brains a safe place to practice dealing with emotions or situations that we may not encounter during our daily lives. So that we don't act out theses emotions, our muscles become temporarily paralysed during REM sleep. Others think we have this stage to unlearn memories, or to process unwanted emotions or feelings. Each idea has its flaws and no one yet knows the real answer, it could be suggested that the two theories merge and we actually do both.

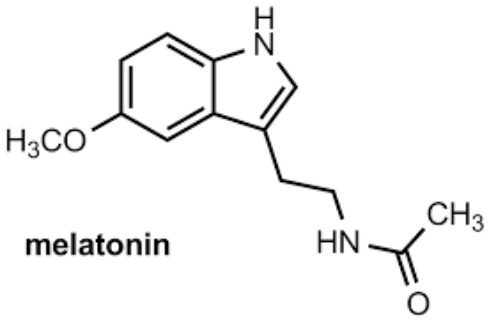
Hormones, Proteins and the Brain

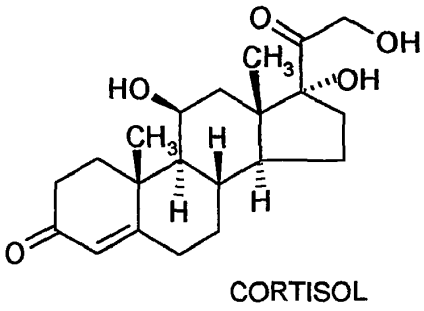
Nearly all of our bodily functions that help development, digestion, metabolism, and reproduction are controlled by specific hormones that are secreted into the blood or tissue fluids to target and stimulate the activity of certain organs or to encourage and generate large-scale effects throughout the body.[11] The term 'endocrine' means 'internal-secreting', thus why we have our endocrine system. The endocrine system

[9] http://www.brainworksneurotherapy.com/what-are-brainwaves

[10] https://www.ted.com/talks/jessa_gamble_how_to_sleep/transcript

[11] https://sciencealert.com/chemical-messengers-how-hormones-help-us-sleep





Figures 1 and 2, chemical structures of melatonin +

includes a number of different glands that secrete and produce chemical substances and hormones that regulate cell and organ activity. The endocrine system includes glands such as the pituitary gland (controls all other endocrine glands and the growth hormone), the hypothalamus (regulates hunger, and many involuntary mechanisms such as body temperature), the pineal gland (Melatonin-sleep), and the thyroid glands (regulating energy and metabolism-the conversion of nutrients into energy). From this information we can see how relative and necessary the endocrine system is to sleep.[12] Even though it does not directly control our sleep; by stimulating other glands which then send chemical messengers to the areas in our body that make us awake or tired, the complex system still plays a large part. Figures 1 and 2 are the chemical structures of two hormones that play a large part in sending messages to our bodies telling us what time it is. The formula of melatonin is C13H16N2O2. Cortisol, a steroid hormone that gives us energy has a formula of C21H30O5. These two hormones work together efficiently, releasing at different times in the day and helping us stay awake or become sleepy. (See figure 3, concentration of cortisol vs melatonin during the night)

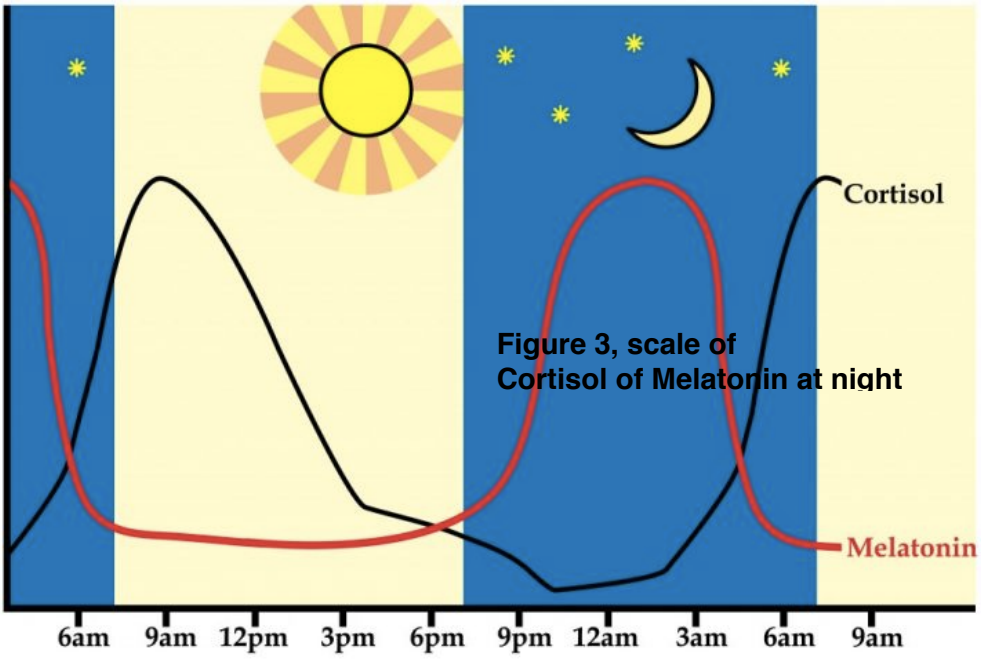


Figure 3, scale of Cortisol of Melatonin at night

Nearly each one of the trillions of cells in our body has a molecular clock. Every 24 hours, dedicated clock proteins perform a 'slow dance' as they interact with one another. When they dance during the day, results show the timely expression of genes which control the release of hormones which then proceed to control the many bodily processes, such as the release of the sleep promoting hormone melatonin, made by the pineal

[12]https://www.webmd.com/diabetes/endocrine-system-facts#1, WebMD, What Is the Endocrine System? Accessed November 16, 2017

gland.[13] Light stimulates a nerve pathway from the retina of the eye all the way to the Hypothalamus located at the back of the brain, and further into a special centre called the suprachiasmatic nucleus (SCN). SCN initiates various signals to parts of the brain that control hormones, body temperature and functions that are responsible for making us feel sleepy or awake.

Sleep is turned on and off as a result of different interactions and reactions inside the brain. The hypothalamus has many interesting structures that include what we call the 'biological clock.' While interacting with other areas within the hypothalamus, the lateral hypothalamus and ventrolateral pre optic nuclei (VLPO)[14], seen in figure 4. They combine to send projections down to the brain stem. Then, they project forward and bathe the cortex of the brain with neurotransmitters which keep us awake and provide us with our consciousness.[15]

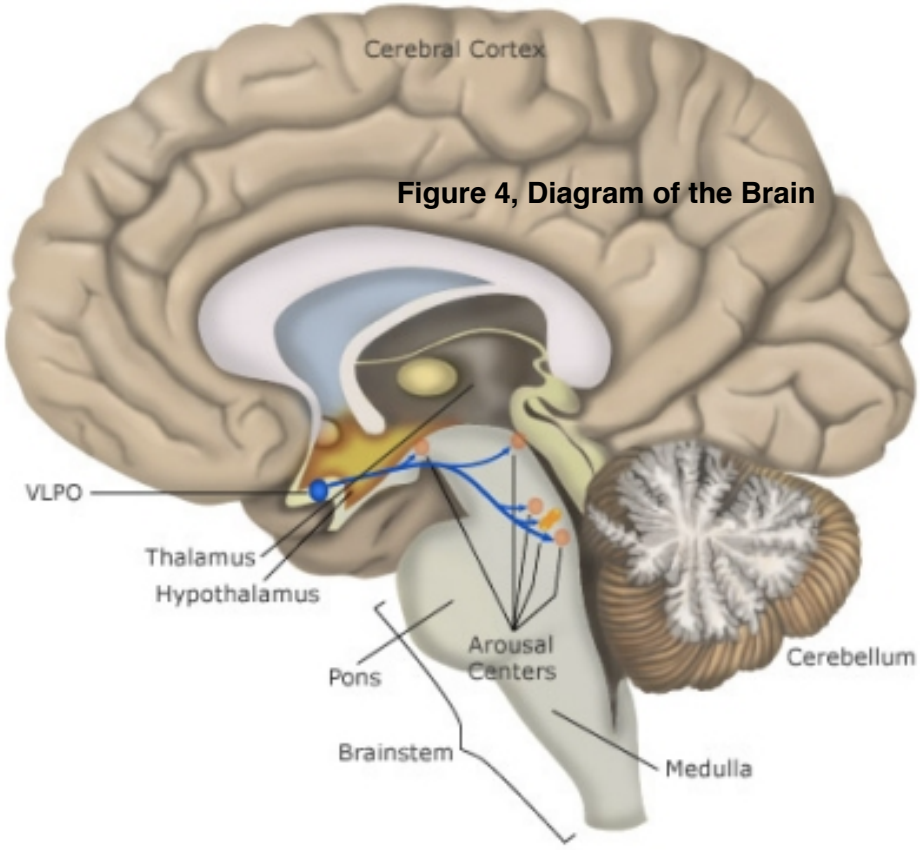


Figure 4, Diagram of the Brain

Neurotransmitters are chemical messengers that carry, balance and boost signals between nerve cells, neurons and other cells in the body. They transmit messages/signals across neuromuscular junction, (a chemical synapse) from one nerve cell to another or to a targeted neuron (a gland cell or muscle cell). The neurotransmitters are released from synaptic vesicles into the synaptic cleft, then they are received by receptors on the target cells. They live in a synapse in synaptic vesicles, grouped underneath the membrane in the axon terminal. They are then released and diffused over the synaptic cleft, where they join and bind to certain receptors in the membrane. Figure 5 illustrates the functions and structures related to neurotransmitters. The only direct actions of neurotransmitters are to other active

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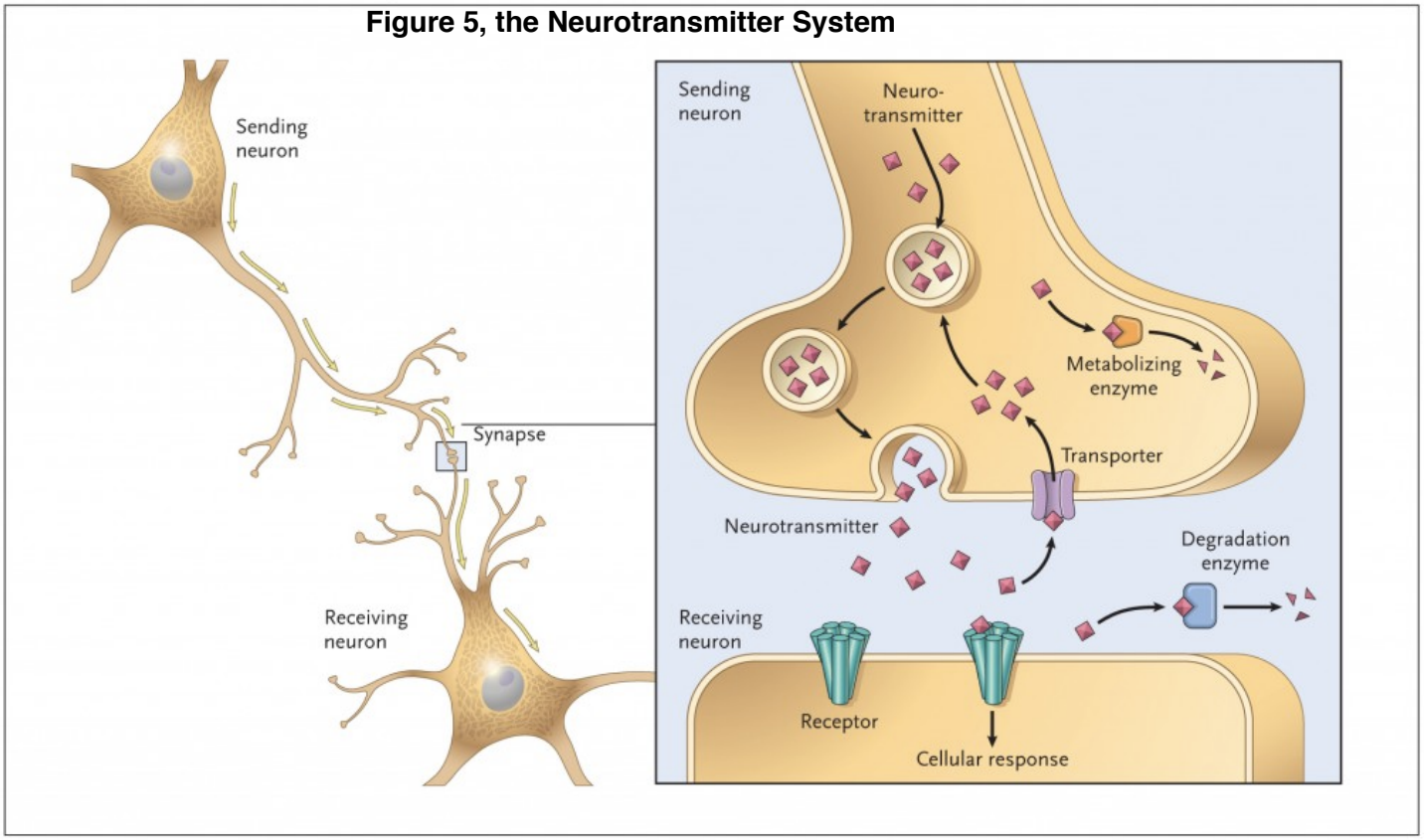
[13]https://theconversation.com/scientists-are-unraveling-the-mystery-of-your-bodys-clock-and-soon-may-be-able-to-reset-it-84022, The Conversation, Scientists are unraveling the mystery of your body's clock – and soon may be able to reset it, November 15, 2017, Accessed November 16, 2017

[14]https://www.ted.com/talks/jessa_gamble_how_to_sleep/transcript, Jessa Gamble: Our natural sleep cycle is nothing like what we do now | TED Talk, Our natural sleep cycle is nothing like what we do now, Accessed November 07, 2017

[15]https://www.ted.com/talks/jessa_gamble_how_to_sleep/transcript

Generic Neurotransmitter System

Figure 5, the Neurotransmitter System



receptors; so the effects of the entire neurotransmitter system ultimately depend on the particular connections belonging to the neurons that use the transmitter and chemical properties of the receptors that the transmitter binds onto.

There are some critical neurotransmitters that affect our body considerably, such as: Dopamine, regulating motor behaviour, motivational pleasures and emotional arousal. Schizophrenia has been related and linked to high levels of dopamine, whereas Parkinson's disease is connected to low levels of dopamine in the body. [16] Serotonin is a neurotransmitter that is mostly produced and found in the intestine, approximately 90% of it. The last 10% is found in the neurons of the central nervous system. Serotonin is responsible for regulating sleep, appetite, memory and learning, mood, behaviour, temperature, cardiovascular function, muscle contraction, and endocrine system function. It is thought that serotonin can be related to depression, as some patients with depression have been found to have lower concentrations of serotonin in their brain tissue and cerebrospinal fluid (found in the brain and spinal cord).[17]

Sleep deprivation

There are clear connections between the complex functions of the neurotransmitters, and their actions of connecting vital chemicals which affect factors of our wellbeing, such as sleep and behaviour. Whether we are awake or asleep, and with no days off,

[16] https://en.wikipedia.org/wiki/Neurotransmitter

[17] https://supplementsinreview.com/nootropic/what-are-neurotransmitters/, Supplements in Review, Protein, April 06, 2016, Accessed November 16, 2017

our bodies are constantly messaging back and forth, sending helpful chemicals and signals to different parts to achieve so many different things, that we most likely not conscious of. Are we making it more difficult for our bodies to achieve these goals by not sleeping properly and doing things we know negatively impact our health? Should we *help* and *assist* our bodies by having mindful and more respectful opinions towards sleep?

By looking at everything that goes on in our bodies during sleep, we can see a clear strong line connecting our health and how well we sleep. Over the past few years, great attention has been paid to obesity as an emerging worldwide health crisis. Among other health problems affecting the globe, research has been put into HIV, malnutrition and chronic diseases that are on the increase.[18] Recent studies addressed our lack of knowledge in sleep and came across staggering results that show as many as 150 million people worldwide currently suffer from sleep problems.[19] When putting this information together with the knowledge that sleep deprivation causes an increase in the release of the hunger hormone ghrelin and that the imbalance of ghrelin (increasing our appetite) and leptin (made by fat cells and decreasing our appetite), can cause our body to think it is hungry when it is not, leads me to ask the question; *Why* is obesity a fast growing health epidemic? Can it be connected to sleep? After one week of sleeping 5 hours a night, your GP would classify you as pre diabetic because of the disruption of blood sugar levels.[20]

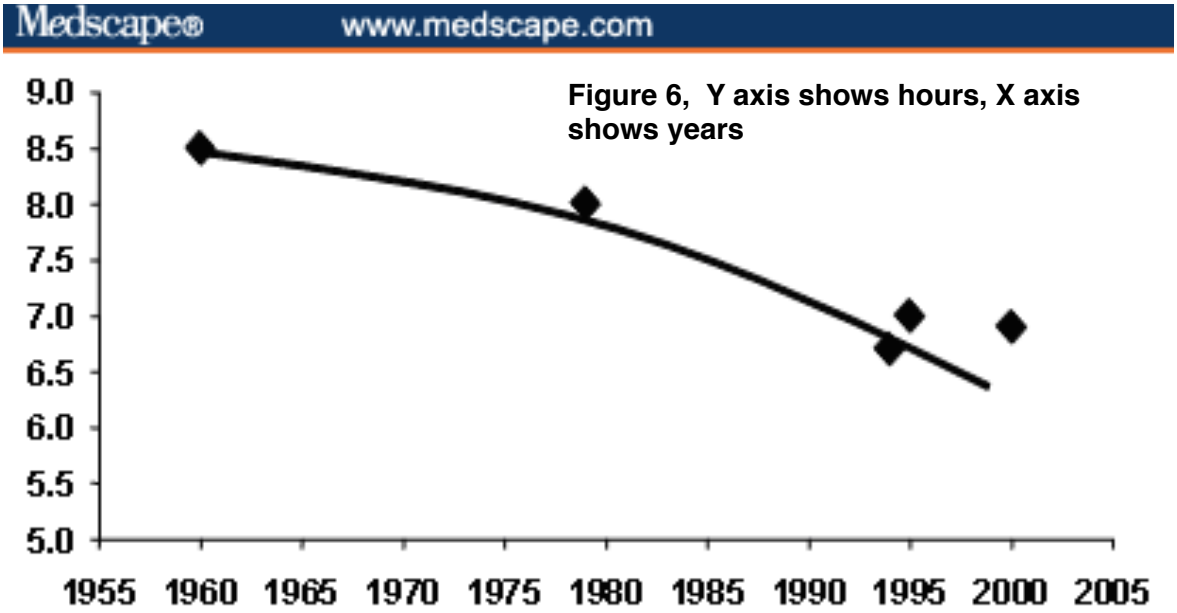


Figure 6, Y axis shows hours, X axis shows years

[18]https://www.psychologytoday.com/blog/sleep-newzzz/201208/are-sleep-problems-the-next-global-health-crisis, Psychology Today, Are Sleep Problems the Next Global Health Crisis? August 20, 2012, Accessed November 16, 2017

[19]https://www.psychologytoday.com/blog/sleep-newzzz/201208/are-sleep-problems-the-next-global-health-crisis

[20]https://www.thetimes.co.uk/article/lack-of-sleep-will-implode-your-immune-system-gzqjmrw9g, Weekend | The Times & The Sunday Times, 'Lack of sleep will implode your immune system', September 30, 2017, Accessed November 07, 2017

Figure 6 is a graph illustrating the changes in self reported sleep duration over 50 years. In 1960, the survey found over 1 million people said they were sleeping 8.0-8.9 hours a night.[21] In 2000, 2001, 2002, polls made by the National Sleep Foundation showed the average time of sleep for Americans had dropped to 6.9-7.0 hours. It seems overall that sleep duration appears to have decreased by 1.5-2 hours during the second half of the century. Later on, in 2005+ many people were only getting 5-6 hours on a regular basis per night. [22]

Mathew Walker, a professor of neuroscience and psychology, and the director of the Centre for Human Sleep Science at the University of California, Berkely, says, "Short sleep duration predicts short life". He wants to warn the world, individuals, businesses and governments that sleep is not an indulgence. Insufficient sleep increases blood pressure, while ramping up the 'flight or flight' responses causing heart rates to also increase. Sleep loss can be associated with a number of health issues including diabetes, cancer, Alzheimer's, obesity and poor mental health.[23] Stress chemicals such as cortisol and adrenaline can also collect after lack of sleep, causing vascular damage. As previously mentioned, the growth hormone is released during sleep, without it, we cannot replenish the endothelium, the lining of our blood vessels. "Studies show those individuals who are getting five to six hours' sleep (a night), over a three-year period show a 200 per cent increase in calcification of their coronary arteries, the main corridor of life to your heart", Professor Walker says.[24]

Almost more alarming evidence shows that even small changes in sleep duration can have great effects. This is shown in one experiment that is conducted on 1.5 billion people across 70 countries twice a year. During springtime when we lose an hour of sleep, there is 24% increase in heart attacks. To contrast, in Autumn when we gain an hour of sleep there is a 21% decrease in heart attacks. [25] This clearly shows the sensitivity of our cardiovascular systems to sleep, even with such a small change.

A lack of sleep will also restrict our immune system from being effective. Walker says, "We all have a set of immune cells called natural killer cells, which seek out cancer cells and destroy them. If I limit you to four hours' sleep for a single night, that will drop your level of key cancer-fighting cells by 70%. "Today you and I will have produced cancer cells in our body. What stops them developing is these natural killer cells—so you can see how just a single night is so important." After research like this, the link between

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[21]Kripke D, Simons R, Garfinkel L, et al. Short and long sleep and sleeping pills. Is increased mortality associated? Arch Gen Psychiatry. 1979;36:103-116.

[2222]National Sleep Foundation. Sleep in America Poll, 2001-2002. Washington, DC: National Sleep Foundation.

[23]https://www.thetimes.co.uk/article/lack-of-sleep-will-implode-your-immune-system-gzqjmrw9g, Weekend | The Times & The Sunday Times, 'Lack of sleep will implode your immune system', September 30, 2017, Accessed November 07, 2017

[24]https://www.thetimes.co.uk/article/lack-of-sleep-will-implode-your-immune-system-gzqjmrw9g

[25]https://www.thetimes.co.uk/article/lack-of-sleep-will-implode-your-immune-system-gzqjmrw9g

cancer and sleep could not be ignored. The World Health Organisation, WHO, has now classed any kind of nighttime shift work as a probable carcinogen.[26]

Our Environment

Now we know how many hundreds of crucial health factors are connected to sleep, is it possible the percentages of those with sleep deprivation could change? Maybe we needed the 3 scientists to win the Nobel prize, just so this world health issue could be recognised and addressed properly. It is an issue that cannot be cured with a medical prescription. People need to take the problem into their own hands and control their sleep. It could be suggested that laws are made to induce proper sleep, but laws do not always stop people doing things. Where I live in London, the city almost always feels alive, and never seems to sleep. Street lights turn on when it gets dark, the tubes run all night and people begin partying at midnight. Our living habits will always be hard and slow to change. Offices almost exclusively use artificial light, and encourage their employees to work using laptops or tablets, meaning they have no idea when the sun goes down. One could argue, that the way we live at the moment is successful; everything gets done, we have to work and earn money and have enough time to do everything, but we do keep going into the evening or night before we stop. My answer to that would be: it is not what we are doing, but how we do it and what we are missing out on. Sleep could be used to cure so many health problems. Why don't we encourage proper sleep before prescribing countless expensive medicines.

Mental illness has recently been identified as not having enough funding or recognition. Thousands are suffering and not being given a justified or effective service. Sleep disruptions can be a very early sign of many mental illnesses, in particular schizophrenia and bipolar. So, is sleep being used to its advantage? An encouragement of 'Sleep Therapy' could lead thousands of sufferers on the road to recovery; without using synthetic drugs such as steroids or sleeping pills which actually completely alter our bodies natural rhythms. It is unlikely 'Sleep Therapy' will be prescribed unless the idea has full support from governments and major health organisations, who at the moment, are believed to actually be controlled by the very rich and powerful pharmaceutical companies that sell sleeping pills.

Hopefully in the next few years, certain countries or at least cities will notice the importance of sleep, encourage people to use their windows and therefore save money by using the natural sunlight. Maybe one day we will look back and be ashamed that we used to stay up all night, scrolling through our emails or staring at the glaring screen of a TV. Some countries are ahead of the game, and have introduced laws around wireless internet and phone use around children, which has also been found, through research, to damage childhood development and cause Insomnia.[27] For example;

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[26]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC295451, Journal of Clinical Investigation September 1991, Four different mutations in codon 28 of alpha spectrin are associated with structurally and functionally abnormal spectrin alpha I/74 in hereditary elliptocytosis., Accessed November 16, 2017

[27]https://www.globalhealingcenter.com/natural-health/10-shocking-facts-health-dangers-wifi/, Dr. Group's Healthy Living Articles, 10 Shocking Facts about the Health Dangers of Wi-Fi, October 02, 2015, Accessed November 16, 2017

France passed a law in 2015, banning Wifi in nursery schools. They also banned ads for phones aimed at children younger than 14, and any phones made for children under 6. In Israel the Education Ministry instructed that all schools must perform radiation tests to asses Wifi. These law changes show that we do know how much our 'over use' of technology affects us, and our sleep and that we are taking steps, even small ones, in the right direction. But what more could we do? If you work in an office you are surrounded by computers, and no laws in place controlling the use of them. In fact most places have wireless internet: cafes, trains, underground stations, even planes now have Wifi.

The abundance of Wifi is very practical and useful but also means that it is almost impossible to never be around these dangerous radiation currents. But, we seem to ignore this and actually increase our exposure to radiation by taking out our phones as soon as we leave work or have nothing to do. It may be dark outside but what difference does that make if we have street lights to light our way home and a programme or game on the screen to stare at. We can even read a book on our phone. Because of our ever growing habits with phones and technology, along with the incredible developments of smartphones, that allow almost anything to be done with a single small block of technology. It could be suggested that it would be impossible to ever go back and alter our habits and inventions.

A survey conducted by Aviva health insurance, found data from 14 countries that revealed people in the UK are the worst sleepers. [28] Closely followed by Ireland, Canada and Poland. People in India were reported the best sleep.

'Proportion of adults who disagree that they get the right amount of sleep':

UK 38%
Ireland 35%
Canada 34%
Poland 31%
Singapore 31%
France 30%
USA 30%
Italy 26%
Spain 23%
Hong Kong 22%
Turkey 21%
Indonesia 18%
China 11%
India 7%

[28] http://www.huffingtonpost.com.au/2017/07/24/the-best-and-worst-countries-for-getting-a-good-nights-sleep_a_23044906/, Huffington Post Australia, The Best And Worst Countries For Getting A Good Night's Sleep, July 20, 2017, Accessed November 16, 2017

Dr Neil Stanley, an independent freelance sleep expert for over 34 years, suggested that the reason Brits are not great with sleep is because of our culture.
"One reason why the U.K. has such a problem with sleep is because we've created a 24-hour society more than any country in Europe," He said. [29] This quote I believe holds a lot of truth. We have supermarkets open all night, overnight television and 10 years ago government passed a law which said pubs could be open for 24 hours. This contrasts greatly to France and Switzerland where they are closing down music clubs in residential areas and where it is hard to find a meal after 10pm. In Switzerland it is even forbidden to use the washing machine after 10pm. In some Swiss neighbourhoods, Germany and Austria, shops close earlier than in other countries and it is forbidden to flush the toilet between midnight and 6am.[30]

"If you're paid 40 hours a week you should work 40 hours a week, but we are always connected – even though last thing you should go before bed is work," he said. "The essence of the problem is that Brits see sleep as disposable – as the thing to do after you've done everything else. There is so much evidence that poor sleep is bad for many aspects of physical, mental and emotional health; the world would be a nicer place if we had more sleep."[31]

The issue with finding solutions to the worlds problems surrounding sleep are that they nearly always come down to a personal decision. Of course if everyone used their initiative to control their balance of sleep, work and technology, then we would definitely see a rise in employee concentration, quick solutions found to important problems, and possibly even better decisions made by politicians and governments. There is no doubt that there would also be a decrease in obesity, mental health illnesses and all other health problems that are linked to sleep, which at the same time would save the NHS millions of pounds.

There are ideas that we could control sleep externally, for example: Employer-supported Initiatives. Some industries have already proceeded and instituted regulations to limit work hours, especially for workers who's jobs impact public safety (pilots, medical residents, truck drivers etc). This change has had very positive effects, shown in changes within The Summa Health System, a major health care delivery system based in Ohio. Here, they cut the shift hours from the original limit of 24 to 16. [32]
"We've created a new standard to allow for sleep recovery and limit time at task to an appropriate level. Our residents are clearly more rested and perform better, which reduces medical errors and increases patient safety and resident satisfaction," says Dr. David Sweet, program director of internal medicine residency at Summa Health System.

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[29]http://time.com/4548883/brits-not-sleeping-enough/, Time, Fighting Insomnia: Why British People Get The Least Sleep, Accessed November 07, 2017

[30]https://www.globalhealingcenter.com/natural-health/10-shocking-facts-health-dangers-wifi, Dr. Group's Healthy Living Articles, 10 Shocking Facts about the Health Dangers of Wi-Fi, October 02, 2015, Accessed November 09, 2017

[31]http://time.com/4548883/brits-not-sleeping-enough/

[32]http://healthysleep.med.harvard.edu/need-sleep/what-can-you-do/changes-at-work, Make Changes at Work | Need Sleep, Make Changes at Work, Accessed November 16, 2017

If more changes like this occurred within our world, it could be suggested and proved that we CAN control our problems with sleep, and thus eliminate chances of sleep induced health issues and poor work. We will therefore not need to spend large sums of money on treating those suffering from ill health. By simply altering our lives to embrace and include the important natural occurrence of sleep, everyone has a chance of being healthier, happier and more awake. The human body is so fascinating and complex, and is capable of numerous things, but for everything to work efficiently we need to understand the needs of the body and give it them. There are approximately 7 billion people on the earth, each of those bodies is composed of a unique set of roughly 100 trillion cells, the key that operates the body is the heart, it beats about 101 thousand times a day and in a lifetime will pump 800-million pints of blood. We breathe constantly, roughly 23-thousand times a day and if the amount of water in your body decreases by 1% you will feel thirsty.[33] These are all natural things our body has to do to keep going, and sleep, as we now know is crucially important to allow our body to work well and go through all necessary processes.

From all my research I have discovered that it *is* important to credit how far our world has progressed; our technological creations and societal developments. Even if our hard work has cost us our sleep. But as each year passes we see more and more cases of critical life threatening illnesses caused by a lack of sleep. That alone must be a signal to the world that something needs to change. We could say that each human is a masterpiece of material creation, an incredible machine that when broken has the ability to fix itself. We are lucky that our natural disposition to sleep when we are tired, actually benefits us by healing and rebooting our insides. We have to charge our phone for it to work, so sleep could be seen as a positive charge for us. If we don't incorporate the right amount of 'charge' into our lives, through physical and mental disease we will begin to struggle and switch off.

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