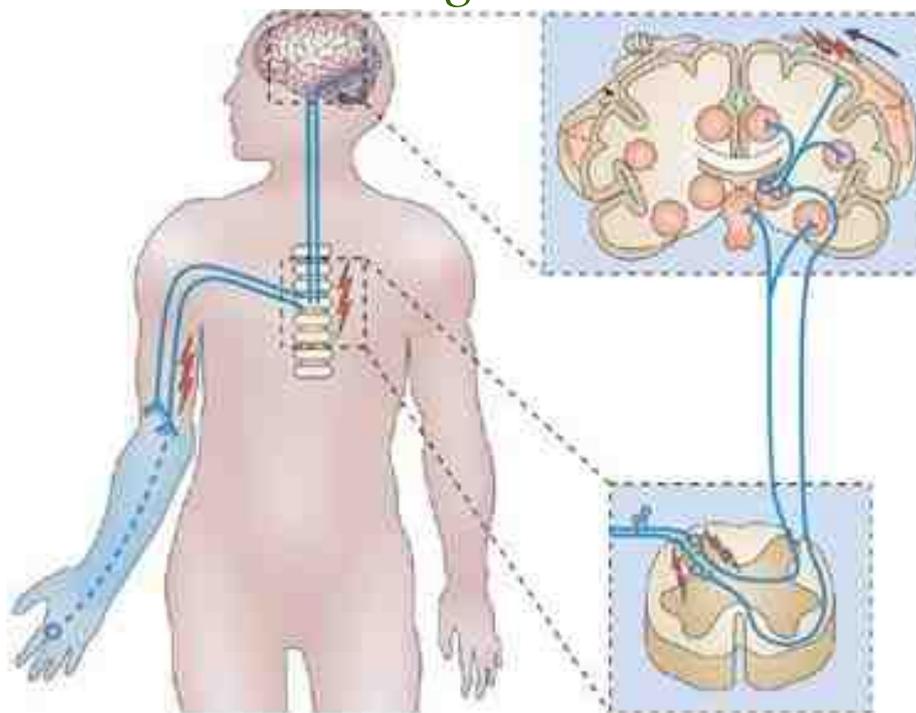


Edited by
Christopher Slade
Nicholas Weise
Samuel Amis



Phantom Limbs

Feeling with the hand that isn't there



By Edmund Bradbury

Phantom Limb Syndrome is an intriguing phenomenon experienced by 80% of people who have undergone amputation or have a paralysed body part. For some people it is a mere distraction, or perhaps a mild irritant, sometimes a sensation that only occurs once or twice (i.e. not a syndrome), for others it is disabling every day of their lives. It has been reported to last for up to 57 years (Abbatucci 1894).

Imagine, a few weeks after having an amputation, you wake to find your foot is itching. You have to scratch it, but when you reach down to do so: there is no foot. The itch is on the foot you do not have, and therefore, can never

scratch.

Phantom Limb Syndrome is the vivid impression that the limb is not only still present, but sometimes extremely painful. This phenomenon, along with the linked phenomena of Referred Sensation has pushed forward neuroscience, with the use of imaging techniques such as MEG (Magnetoencephalogram) and fMRI (Functional Magnetic Resonance Imaging), in the search to answer questions about the brain's 'body image'.

Despite the fact it is called 'Phantom Limb' it does not necessarily only occur in limbs, there are many cases of patients who report sensations in all removed body parts including phantom erection and ejaculations in male

patients after the removal of the penis.

Although it is impossible to predict if the phenomenon will occur when undertaking an amputation, research has recently shown that there is a much higher chance of occurrence after a 'traumatic' loss of a limb. This means that if, prior to the amputation, the limb is painful, and therefore the patient pays more attention to it, the clarity of sensation

is more pronounced in the phantom.

Another intriguing quality of the phantom limb is the fact that it can reactivate suppressed memories. Often patients have reported the sensation of wedding rings, and wrist watches. In very rare cases there have even been reports of the feeling of clenching of the fist when angry, and bringing with it, the sensation of nails digging into the palm. This could be due to the brain linking the clenching of the fist with the nails being felt by the palm and therefore feels this phantom pain.

The position of the phantom limb also varies. The phantom limb will often occupy a 'habitual' posture however, the phantom can

occasionally occupy the same position that caused the pain during a traumatic loss.

There are even reports of a soldier who had a grenade explode in his hand leaving the phantom in a constant painfully clenched position.

The phantom limb can be moved by some patients. Some voluntary movement is possible including waving goodbye, breaking a fall, or even reaching out to pick up a telephone. However, it is not always able to be controlled by the patients; the limb can move involuntarily into different positions such as the clenching of the fist, mentioned earlier.

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Redesigning Humans

By Samuel Amis

I recently read the first chapter of a book entitled *'Redesigning Humans,'* outlying the uncertain and possibly dangerous future of Human genetic engineering.

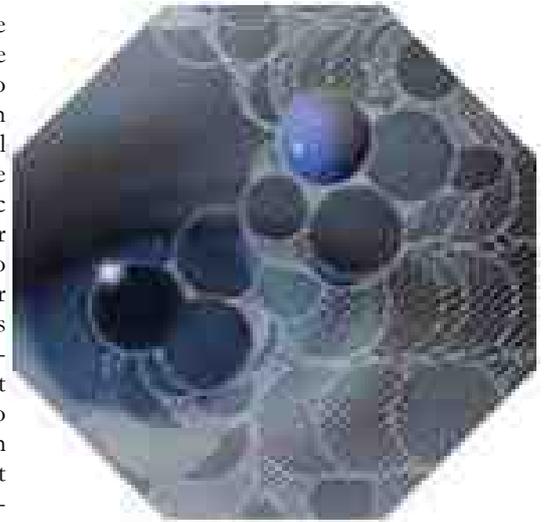
This particular chapter was called 'the Last Human,' an ominous and foreboding title which implies that in the not too distant future humanity will have the technology to genetically alter ourselves to such an extent that present day humans would not even recognise them. Soon we may have ready access to genetically enhancing drugs and gene therapies, that will alter our physical make-up for ever. By continued self-transformations our descendants may not even correspond with our current sense of the word human.

The chapter begins by outlying; how close the author feels we are to successfully honing our immature technologies, transcending our current form and taking the slow process of evolution into our own hands. Even though our biological composition has not radically changed since the time for millions of years we may be on the verge of rapid and significant change. These new discoveries will inevitably pave the way for human genetic engineering.

Many scientists worry about the implications of this new and great power we will

one day have and speculate as to the consequences. Soon we will have the ability to manipulate embryos; to choose our children's genes, which will undoubtedly raise difficult ethical queries. The ramifications of this are unknown but many, slightly optimistic people hope we will foresee any major problems and forgo the technology, to safeguard humanities future. However this is assuming any breakthroughs will come from research trying to perfect selective gene technologies, but it may not. It is much more likely to inadvertently come from mainstream research that most people support such as In-Vitro Fertilisation treatment and curing disease with gene therapy. The author feels (and I agree) that to destroy this new technology in its infancy whilst not even beginning to scratch the surface of its potential because of unknown risks it may pose, is uncharacteristically human. It is a question of when we will use it, not if.

Advances in genomics (the study of an organism's entire genome) and molecular biology will also lead to germline engineering, where the genetics of gametes are altered to affect future generations. Early experiments on non-human primates have already begun. Once safe and reliable germline engineering is available, human self-design is the next natural step. Many dismiss technology's importance in our evolutionary future and would rather believe that in a million years humanity will remain unchanged—this is natural as it is a reassuring belief. Some



hoped that our genetic constitution would be too complex to manipulate but the relatively recent human genome project has deciphered the code, with Watson and Crick's discovery of DNA's double helix structure in 1953, making this possible. The cloning of Dolly the sheep by Scottish scientist Ian Wilmut was another breakthrough. In one century we have gone from observation to understanding to engineering biology.

The most recent innovations in this field have been in the form of DNA chips that read 30000 genes a second, artificial chromosomes that divide as stably as their naturally occurring counterparts and special computers that read our genetic code as easily as binary. These advances are all

Corals Face A New Enemy!

By Nathan Rouse

As if man's attempts to destroy the beautiful habitats of the ocean were not enough, coral reefs now face a new threat. Its new enemy is one of the oceans least notorious scavengers: starfish! The crown-of-thorns starfish, which feeds by spreading its stomach over reefs, has been the cause of much concern in the "coral triangle area"; one of the richest areas of coral, where the starfish have attacked 95% of the reef (hence reducing coverage in these areas by around 95%). However man is, of course, still at the heart of the problem: many of the scientists involved believe that pollution from sewage and agricultural run-off is to blame for a rise in starfish numbers.



'The Last Human'

bringing human genetic engineering one step closer.

It is not hard to imagine that we will one day want to alter our own genetics when we observe the lengths many people go to today to better themselves. The fact that people choose possibly dangerous cosmetic surgery in order to delay the signs of aging or take potentially harmful performance enhancing drugs to win a race, pays testament to this. It is in the nature of all life to compete with one another and as a result when medicine or genetics allows us to manipulate our biology in appealing ways we will. Mistakes will undoubtedly be made and the new technology will be abused, but the challenge will be to minimize risks and protect our rights and freedoms whilst supervising progress, a momentous and difficult task.

However, self-restraint when faced with new technology is not in our nature either. Our history is filled with examples of unrestricted, uncontrolled advances with no thought for the future. The author uses the example of the Clovis tribe who first journeyed across the frozen oceans to the Americas where they drove mammoths and

other mammals to extinction with their new weapons. He also mentions, on a more contemporary basis the overuse of antibiotics that no one foresaw would cause widespread drug resistance, most notably MRSA. We will undoubtedly do as we have always done and learn from our mistakes as we attempt to perfect our technology.

The author continues by scorning the European view of never applying germline gene intervention to Humans, but understands these sensitivities given Hitler's attempts at racial purification and concerns that it will lead to 'breeding mankind' and becoming a social nightmare. He argues that billions have been spent on unravelling life's mysteries not out of idle curiosity but in the hope of bettering our lives which

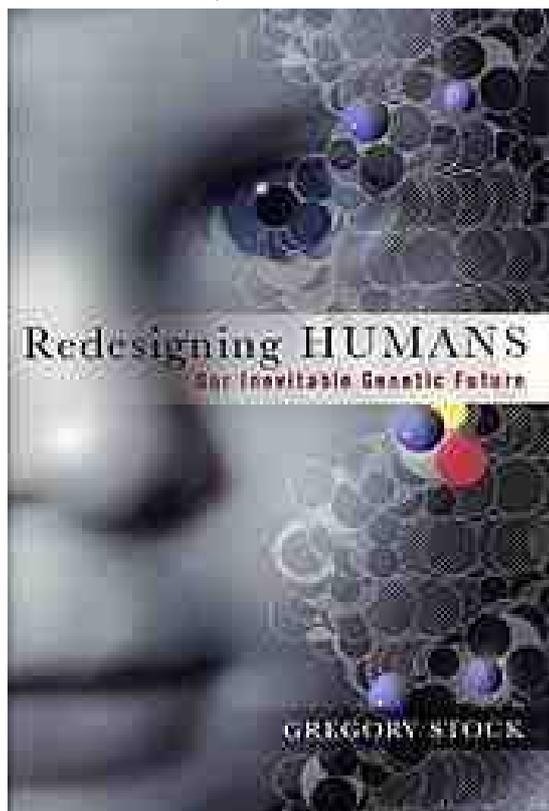
after all is what Human's have been striving to do since the dawn of conscious thought. There is also the argument that gene therapies show promise for curing numerous abhorrent inherited illnesses that can only be cured by corrected genes. A small defect in a gene sequence can cause a protein deficiency ranging from a lack of an enzyme to an absence of a hormone; having a seriously detrimental long-term effect on someone's health. Phenylketonuria is a genetic disorder where a gene is missing, coding for an enzyme that usually breaks down phenylalanine, an amino acid. The substance builds up in the brain causing progressive mental retardation and seizures. There is little a person can do except but gene therapy could cure this illness.

Another example of this is in recombinant DNA technology, which has already helped in the field of medi-

cine. Bacteria have been engineered to make human insulin for diabetes sufferers, which have helped immensely, but with selective gene therapy diabetes could be cured and eradicated.

The piece finishes detailing a completely different yet not entirely irrelevant challenge humanity may face (although it is arguably verging on the ridiculous). With the advancement of computers, often in the field of genetics, and the birth of artificial intelligence possibly just years away it may be, as many science fiction films predict that machines transcend us and gain dominion over life on Earth. This is a considerably larger threat and much darker future than humanity biologically altering itself until it is no longer recognisable. In fact it may even be necessary for us to engineer ourselves to combat this possible threat to our existence but this wondering is best left to the realms of fantasy.

The possibilities for human genetic engineering are endless, only time will tell what the future holds. We are aware of the inherent dangers and will go out to meet them, regardless.



Asthma- the inescapable illness

By- Ali Javad

Asthma is growing disease within our population and seems to be proportional to the worsening air quality in cities. Statistics show that 1 in 4 children living in urban areas are suffering from asthma. The symptoms range from wheezing to coughing but also in very serious asthma attacks the sufferer could turn blue from the lack of oxygen, experience severe chest pain and even lose consciousness; these serious symptoms explain why one person in the UK dies of asthma every 7 hours.

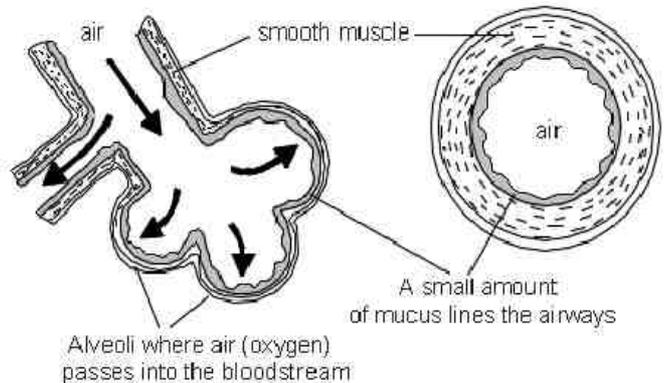
However it's not all doom and gloom, there are several ways a sufferer can live his life so that the symptoms are rendered almost trivial. This can be done by firstly using the preventer daily as advised by your doctor, using the reliever inhaler (a bronchodilator) before any vigorous exercise and eating a balanced, healthy diet. These maybe very general ideas but one way of reducing the severity of the symptoms that many people are unaware of is reducing the consumption of all mucus-forming foods, such as: dairy foods, refined white flour bread and unfortunately chocolates, cakes and white sugar. The reason for this is that already asthma sufferers produce excessive amounts of mucus, this narrows the air passages and causes breathing to become even more difficult as

shown in the diagram. During an asthma attack this can become so serious that the sufferer dies, however something can be done.

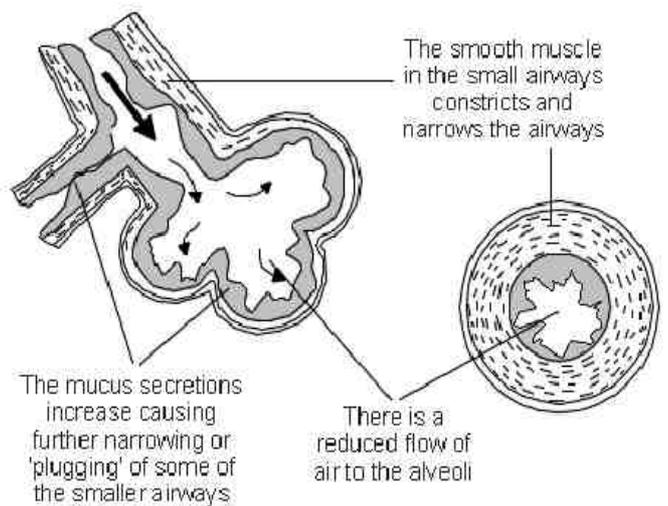
One method of reducing the amount of mucus secretion is by increasing the amount of carbon dioxide in your blood. This can be done by the following technique (and is definitely worth a try when bored in double maths):

1. Sit upright on a straight-backed chair.
2. Normalise and calm your breathing.
3. Take a small breath (two seconds) in through your nose, if possible and a small breath out (three seconds). If you are unable to take a breath in through your nose, take a tiny breath in through the corner of your mouth.
4. Pinch your nose and hold your breath. Keep your mouth closed.
5. Gently nod your head or sway your body until you feel that you cannot hold your breath any longer. (Hold your nose until you feel a relatively strong need for air.)
6. When you need to breathe in, let go of your nose and breathe gently through it, in and out, with your mouth closed. Avoid taking a deep

1. NORMAL LUNG - cross section of small airways



2. THE LUNG DURING AN ASTHMA ATTACK



breath when you breathe in, and calm your breathing as soon as possible by focusing on relaxation.

This technique will not work immediately and as with most things, it requires a lot of practice, after several attempts at this technique it should become second nature to breathe comfortably and steadily through your nose.

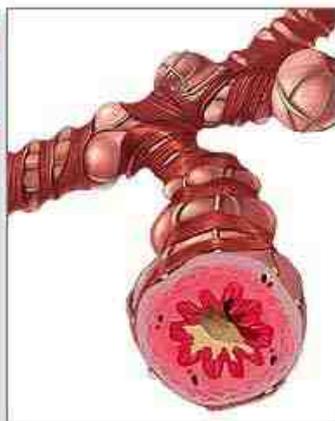
One interesting factor is that there is no real cure for asthma nevertheless some people grow out of it and as a result of a change in environment they manage to overcome it, but sadly it tends to last with the average sufferer all their life. On the other hand, one way of building up immunity is based on the fact that asthma can be a

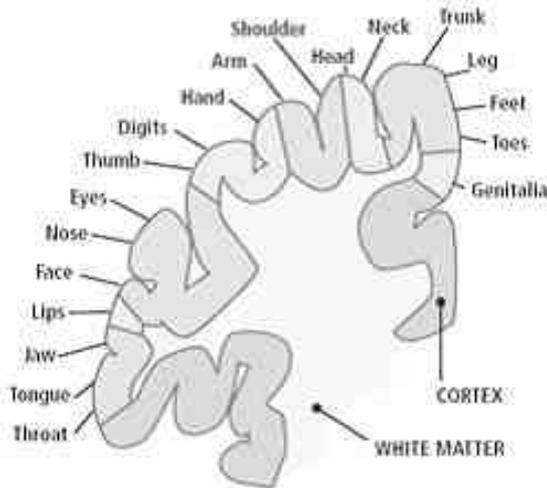
disease of hygiene. When babies are exposed to an unhygienic environment with plenty of bacteria, the TH1 lymphocyte is switched on that deals with bacteria infection and diseases which include asthma. However if a baby is subjected to a very clean environment, the TH2 cells will predominate and therefore the immunity towards diseases such as asthma is reduced quite significantly. From this you could probably make the assumption that an unhygienic baby is a disease-resistant adult. But then again everyday, doctors around the world are investigating this worsening problem to develop medicines and remedies to relieve the suffering of asthmatics, and sooner rather than later I trust that a revolutionary idea will be revealed.

Normal bronchiole



Asthmatic bronchiole





(Continued from Page 1)

The related phenomenon called Referred Sensation has been used to build on our understanding of the brain's body image.

When a limb is amputated it leaves a certain area of the brain inactive. The brain matter around the area which controls sensations of other parts of the body can slowly begin to grow into the inactive area. The brain does not realise this has occurred and it still treats the new sensations as if from the amputated limb. For instance: in some cases after the removal of an arm, some patients report that when their face, near to the eye, is lightly rubbed it feels as if the rubbing is occurring on the thumb: from this neuroscientist have gradually built up the Brain's 'Body Map', the eye sensory area being adjacent to the thumb sensory area. This can be displayed as a simplified diagram:

There have been many studies into effective cures for phantom limb, and more speci-

cally, phantom limb pain. In some extreme cases doctors have re-amputated the stump believing the source of the pain to be from inflamed nerve endings rather than neurological pain. Acupuncture has also been used, along with mechanical and electrical stimulation of the stump. More recently more experimental methods have started to be used, the most note worthy of which being the 'Mirror-Box'.

In cases where the limb is in a painful position doctors use a box with mirrors reflecting the non-

amputated limb to create the impression that the painful limb is still attached. In many cases this enables the patient to 'move' the limb into a pain-free position. For some, this may be a procedure that they must repeat every time pain occurs; for others the pain leaves as soon as the limb is moved for the first time.

Such procedures are still experimental. However the 'Mirror-Box', and further developments in video imaging, to create a similar but even more convincing effect, appears to be an extremely promising new insight into the treatment of Phantom Limb Syndrome.



The mirror box. A mirror is placed vertically in the centre of a wooden or cardboard box whose top and front surfaces have been removed. The patient places his normal hand on one side and looks into the mirror. This creates the illusion that the amputated hand has returned.

(Reference: "The perception of phantom limbs- The D. O. Hebb lecture" for case studies and above photograph.)

The Linnean Society, London

By Edward Bell

Carl Linnaeus, father of modern taxonomy, is perhaps one of the most pre-eminent characters in Biology's history pre-Darwin. His numerous contributions to the classification system of the natural world include the creation of the starting point of the binomial nomenclature (the formal system of naming species) and the identification of over 1200 organisms in his most famous works *Systema Naturae*.

The Swedish Botanist, Physician and Zoologist left such a legacy that the Linnaean Society in London was founded as a centre

for taxonomy and natural history in his wake. Since its formation in 1788, the society has developed a vast library of all things biological as well as holding some of Linnaeus' original writings and preserved specimens. The Linnaean Society is situated in Burlington House Piccadilly alongside the Geological Society of London, the Royal Astronomical Society, the Society of Antiquities and the Royal Society of Chemistry. The Linnaean Society is one of the few remaining scientific establishments of its kind in the world. The library is open to all but requires an appointment first.



Eduardo – Just bad luck?



By Joe Robinson

The recent injury to Arsenal's Eduardo is likely to end his career and Martin Taylor (the player who broke Eduardo's leg) gets all the blame and has been receiving death threats. Even Arsene Wenger, the Arsenal manager said he should never play football again (which he later retracted.) Was this tackle malicious and dangerous or was it just very very bad luck?

Every week we see late, studs-up challenges in the Premier

league and quite often the punishment does not even extend to a yellow card. When I saw the incident on the television it did not look like much and I thought that Taylor was only going to a caution and my family and I were both shocked when the red was shown. It was not until we saw the panic in the players' faces and their reaction to the tackle that we realised it must have been pretty bad.

Eduardo suffered three breaks of his left leg and a dislocated

foot to go with it. Eduardo received a double compound fracture and a further break to his leg. Doctors say he was lucky not to lose his foot. So why was this fairly standard foul a tragedy for Eduardo, Arsenal and football in general?

Firstly we must look at the speed they were each travelling, they were travelling in opposite directions and Eduardo is known for his quick feet and pace. Martin Taylor was flying in to tackle him. These two factors add up to a pretty powerful impact. However, we see tackles like this happening all the time, even house football is filled with them. There must have been more to it than just the speed.

Next we can look at leverage, if Eduardo's foot had been in the air when he was hit the momentum would have just sent his leg backward and he would have just fallen over. Unfortunately he had his foot on the ground when he was hit. Stud

on football boots are designed to grip the ground to avoid slipping over when running and turning quickly. This meant that his foot would not move from the ground but damage could be minimised if his knee bent. Again luck was against him and the tackle hit him at the side and the knee only bends backwards. With only one way left to go the bone snapped and came out of his leg and ripped through his sock. I've seen, even received tackles like this which have done nothing but a moment of pain so this injury must have been down to pure bad luck.

At the time Sky Sports refused to show a replay of the incident on grounds of taste. Match of the Day showed the injury once in the evening showing after a warning but not the following morning. News programmes showed it from a non-distressing angle. Within minutes of the injury, hundreds of videos were put on YouTube but have now all been removed by a company known as NetResult.

Cannabis- What's the Risk?

By George Butcher

Cannabis is one of the most popular illegal drugs in the world and is used by people of all ages. Even at our age many people try it at parties and other events when they are told it is fun or forced into it by friends. Most people who take the drug don't realise the many bad effects it can take on your body.

Firstly it can make the user paranoid and anxious. This causes people to become violent and uncooperative with others and can often link to young kids developing schizophrenia. It also has many of the same effects on your respiratory system as smoking cigarettes for example getting lung

cancer or emphysema. These are very dangerous conditions that often kill. Similar to alcohol it also affects reactions and your ability to make good judgements. Therefore car crashes are common among cannabis users and people are injured because they get into a car being driven by someone

who is 'stoned'. Your short term memory is also disrupted and after use people often can't remember what they had done recently before or while they were under the influence of the drug. The next day you can still be affected as well so it is important not to take it if you are required to have a sharp mind

for your job. Finally, if you take cannabis combined with alcohol your chance of becoming ill increases greatly. This happens a lot of the time because of parties where people do it for fun and then drink large amounts of alcohol afterwards with friends.



In conclusion I believe that although it is the person's choice whether they take cannabis or not, I have outlined the risks above. For young people especially Cannabis can be extremely dangerous and life destroying. It is only a Class B drug but there is a big possibility that it will move to Class A in the future as some scientists believe that it leads on to hard drug use.