Impactors Of The Unconsciousness Of The Human Brain

Introduction:

Acute traumatic, nontraumatic brain injuries, degenerative and metabolic brain disorders, and severe congenital malformations of the nervous system all lead to the state of unconsciousness. An individual who is medically induced or traumatically induced is in a deep state of prolonged unawareness and cannot be forcefully awakened. This may be due to the lack of oxygen and blood flow surrounding the brain, traumatic causes such as critical injuries (major car accidents), dysfunction in nerve cells, brain infections encephalitis inflammation) such as brain fluid, swelling and bleeding all contribute in an abnormal brain. Scientists, professors and neurology specialists have studies different causes and complications to discover advanced technology to help recover, rehabilitate and measure the consciousness within a suffering and unconscious brain. Vegetative, persistent vegetative and minimally conscious states are all factors of the aftercare that takes place when the brain naturally emerges out of a comatose state. During a comatose state of mind, cells start to degenerate and the communication pathways that allow electrical and chemical signals to pass along via neurotransmitters become blocked, interrupting the capacity of activity. Conditions such as dementia, along with the risk of falling into a comatose state are possible. A suffering brain, accompanied by a stroke or heart attack before or after emerging out of a comatose state can be the prime cause of a dying brain.

Causes of a state of unconsciousness:

A coma is a deep state of profound unconsciousness, similar to deep sleep, however, no amount of external stimuli (such as sounds or sensations) can promote the brain to become aware and responsive of any surroundings. A wide range of intracranial and extracranial causes result in a state of unconscious.

Intracranial pressure is the increased pressure around the human brain, by cause of cerebrospinal fluid, (the fluid that surrounds the brain and spinal cord) inflammation or bleeding within the brain itself (Carey, 2017). Bleeding naturally within the brain is due to a brain haemorrhage in or around the brain. This is initiated by a bursting artery in the brain, causing localized bleeding surrounding tissues, killing brain cells (Medlineplus.gov, 2019). Bleeding can occur within, in-between brain membranes or between the skull, covering it at full extent. Edema (swelling) happens when a small blood vessel leaks fluid into nearby tissues. If edema occurs within the brain it will cause problematical disputes, also restricting the supply of blood to the brain (WebMD, 2019).

An extracranial cause is the event of brain hypoxia, which is responsible for the lack of oxygen or blood flow to the brain. The human brain becomes deprived of oxygen due to drowning, suffocating, cardiac arrest and strokes. Hypoxic brain injuries occur when the brain receives less oxygen than it needs (requires a minimum of 20% of the human body's oxygen) (Leonard and Nancy Hammond, 2018). It is evident that between 30 -180 seconds of oxygen deprivation, the human brain and body will fall into a state of unconsciousness. It takes one minute for brain cells to die, losing their function. If the body does not fall into a comatose state or is not medically induced, survival becomes nearly impossible. (Villines, 2016) Regardless of surviving

and emerging from a coma, long term effects such as dementia is a major risk factor due to the death of brain cells. (Whiteman, 2017)

Overall, coma occurs when there is a serious problem with the brain's arousal system (the reticular activating system), or with its communications between other brain areas (such as the cerebral hemispheres) and the brain's activity becomes impaired.

In some cases, a person can descend into a persistent vegetative state, where the brain has lost its higher functions (including consciousness, self-awareness and personality) but retains involuntary functions such as breathing and swallowing, heart rate and blood pressure.

How is consciousness measured within an unconscious brain?

Scientists have uncovered new technology that determines consciousness while unconscious by analysing brain activity. Neuroimaging tools such as EGG, MEG and fMRI and transcranial magnetic stimulation provide information on the activity happening within a brain while under comatose conditions and vegetative patients.

· fMRI (magnetic resonance, functional)

Functional Magnetic Resonance Imaging developed to detect the changes in blood oxygenation and flow that occurs in response to neural activity. When certain areas of the brain are more active, more oxygen is consumed increasing the demand for blood flow to the active areas. It has become a standard tool for radiology as it provides high-resolution images, contrasting between different tissues of the brain. (Fmri.ucsd.edu, n.d.)The cylindrical tube of an MRI scanner creates strong magnetic fields around individuals and sends pulses of radio waves. Measuring the blood flow of a human brain also measures brain cells that are found to exert influence on multiple regions of the body. (Devlin, 2018)

This is a standard procedure as detecting blood flow and oxygen within the brain is vital for human survival. Not enough blood flow and oxygen surrounded by the brain also causes brain ischemia, along with the high risk of falling into a comatose state.

· MEG (magnetoencephalography)

Magnetoencephalography is a non-invasive, technique that is used to investigate brain activity while unconscious as it allows the measurement of ongoing brain activity on a millisecond by millisecond basis and demonstrates wherein the brain activity is and is not being produced. Throughout the brain, individual neurons have electrochemical properties that result in the flow of electrically charged ions through a cell. These electrochemical fields are generated y the net flow of this slow ionic current flow. MEG technologies provide information regarding the timing of neuronal activity as well as information about brain activity. (Washington.edu, 2012). This technique is connected to the brain and is done by scanning to produce magnetic source imaging to pinpoint the sources of activity.

· EGG (electroencephalogram)

Normal, functioning, brain wave frequency occur a rate of 30 waves per second, 0.5Hz–4Hz

during deep dreaming sleep and 14Hz-30Hz while awake and alert. While a human brain is unconscious, these waves lengths are unsure of, however, electroencephalogram is used to measure and illustrate bursts of abnormal discharges in the form of spike and sharp wave patterns. This procedure is completely painless as electrodes are connected to the scalp. (Vic.gov.au, 2012)

Post unconsciousness:

· vegetative state VS persistent vegetative state

Consciousness refers to self-awareness and being environmentally aware. However, brain injury, cause a wide range of disturbances of consciousness. Due to traumatic brain injury, the change of severe consciousness causes a vegetative state, also known as the unresponsive wakefulness syndrome, which refers to the preserved vegetative nervous functioning, implicating, individuals who suffer this syndrome variably preserve sleep-wake cycles, respiration, digestion or thermoregulation due to traumatic brain injury. (keen, 2017)

This occurs when the cerebrum (the part of the brain that controls thought and behaviour) no longer function, although the brain stem still actively function. A vegetative state develops as a consequence of hypoxic-ischemic encephalopathy in which the entire brain is involved. Brain swelling, due to brain injury also is a common cause of this global ischemia. Patients in a vegetative state can open their eyes although cannot speak or participate in things that require thought or conscious intention. These occurrences tend to last up to one month until emerging out of a vegetative state. Persons with brain injury transition through the period of unconsciousness and subsequent recovery methods at slower or faster rates, depending on the severity of the injury. (Maiese, 2019)

A persistent vegetative state is also considered a clinical condition of complete unawareness of the self and environment, accompanied by sleep-wake cycles with either complete or partial preservation of hypothalamic and brain-stem function. Individuals who did not emerge out of the vegetative state, suffer the persistent vegetative state who show no evidence of sustained, reproducible, purposeful or voluntary behavioural responses to visual, auditory, tactile or noxious stimuli. Expression and language comprehension is absent and problematic issues within the digestive system are at greater risk such as bowel and bladder incontinence. The lack of cranial-nerve and spinal reflexes also are a factor of vegetativeness due to the state of unconsciousness. As a result of this, individuals who remain in a persistent vegetative state for three months or more do not regain functional skills. These states differ from a comatose state as periods of sleeping and waking are identified, as sleep while medically or naturally induced cannot be roused in any way. Great improvement of these disturbances is less liking due to the lack of oxygen delivered to the brain. (Bender et al., 2015)

Neurotransmitters and their importance:

Neurotransmitters are defined as chemical messages that maintain the cognitive function of all organs and balance signals between nerve cells. Primarily, neurotransmitters function in the Central Nervous System are the brains, chemical messengers, facilitating communication among the body’s gland, organs and muscles. Neurotransmitters and receptors of the brain work in conjunction with one another to influence and regulate a wide range of processes such

as mental performance, emotions, pain response and energy levels (hammoud and berry, 2019). For a human brain to endure its viability, active neurotransmitters need to be regulated. Necessary functions such as heart rate, breathing, sleep cycles, digestion, mood, muscle movement and concentration rely on the signals from nerve cells; neurotransmitters transmit signals from nerve cells to target cells. Hypotheses such as “interventions in disorders of consciousness after brain damage are increasingly appearing in medical literature” this links disorders of consciousness to the diminution of oxygen, dependent on neurotransmitters like, the amino acid axis such as glutamate (responsible for sending signals between nerve cells frequent learning and memory) and the monoamine axis such as dopamine (made by the human body which is responsible for concentration, motivation, attention and regulating body movements). After traumatic brain damage, an immediate response inside the brain composes a stream of glutamate. This particular neurotransmitter is stimulating and GABA inhibitory; as a consequence of the neuron’s action potential decreasing. Once this inhibitory response becomes activated, it dominates and the brain becomes suppressed, leading to a loss of consciousness, reducing oxygen (Ncbi.nlm.nih.gov, n.d.).

Conclusion:

To conclude, it was sophistically researched that aspects such as swelling, bleeding and suffocation within the human brain are the initial causes of a state of unconsciousness in amalgamation with traumatic injuries and medically induced procedures, due to emergencies. It was discovered that these elements seize the brain to lose function, being mentally, physically and emotionally damaged as the brains intellect, power and dominance experiences scarce disturbances. In addition to this, while an individual is unaware of all surroundings it is not impossible to foretell future consciousness and present activity within the brain, as scientists have developed techniques such as magnetoencephalography, which is a piece of methodological machinery that investigates neurons especially, at an exceptionally advanced level. This makes it achievable to study and analyse the brainwaves, the current function of neurotransmitters and the supply of blood and oxygen flow the brain is surrounded by. Therefore, elucidating the impression that brain damage as such, is impacted by the traumatising disturbances an individual experiences and transformation of neurology.

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