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SMILE TO LAUGH & LAUGH TO SMILE: THE FIVE MEN ARMY TO IMPROVE VASCULARITY

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Abstract: Your body releases three hormones that make you feel good when you smile. They include dopamine, endorphins and serotonin. These signal to your body that you're happy, and in turn, you feel happier. Laugh makes a sound and is open-mouth gesture with greater degree of emotion. Smile is just the moment of lips (lips intact) in an arc shape with no sound. Laugh and Smile are two words in the English language that are often confused due to the appearing similarity in their meanings. Strictly speaking there is some difference between the two words in terms of their meanings. The word 'laugh' is used as a verb and it is used in the sense of 'opening your mouth and expressing your appreciation of comic sentiment in a loud manner' as in the sentences.

Keywords: Smile, Laugh, Dopamine, Endorphin, Serotonin, Cortisol, Adrenaline, Salvinorin A.

Etiology: Smile is to make a happy or friendly expression in which the corners of your mouth curve up: He smiled and shook my hand. Smiling not only offers a mood boost but helps our bodies release cortisol and endorphins that provide numerous health benefits, including: Reduced blood pressure. Increased endurance.^[1] World Laughter Day was established in 1998 and the first celebration was on **10 May 1998**, in Mumbai, India, arranged by **Dr. Madan Kataria**, founder of the worldwide Laughter Yoga movement. The day is now celebrated on first Sunday of May worldwide. World Laughter Day was created in 1998 by Dr. Madan Kataria, founder of the worldwide Laughter Yoga movement. Dr. Kataria, a family doctor in India, was inspired to start the Laughter Yoga movement in part by the facial feedback hypothesis, which postulates that a person's facial expressions can have an effect on their emotions. The celebration of World Laughter Day is a positive manifestation for world peace and is intended to build up a global consciousness of brotherhood and friendship through laughter. It is most often celebrated by gatherings of people in public places with the sole purpose of laughing. Its popularity has grown exponentially with that of the Laughter Yoga movement now counting thousands of Laughter Clubs in more than 115 countries and now it is celebrated worldwide.



Figure-1: Smile & Laugh with founder Dr. Madan Kataria [Founder of Laughter Day]

Smiling increases mood-enhancing hormones [serotonin (CAS: 50-67-9; 5-Hydroxytryptamine), dopamine (CAS: 51-61-6; 2-(3,4-Dihydroxyphenyl)ethylamine), endorphins (α : CAS: 61512-76-3; Tyr-Gly-Gly-Phe-Met-Thr-Ser-Glu-Lys-Ser-Gln-Thr-Pro-Leu-Val-Thr-OH, β : CAS: 60617-12-1; Tyr-Gly-Gly-Phe-Met-Thr-Ser-Glu-Lys-Ser-Gln-Thr-Pro-Leu-Val-Thr-Leu-Phe-Lys-Asn-Ala-Ile-Ile-Lys-Asn-Ala-Tyr-Lys-Lys-Gly-Glu), γ : CAS: 61512-77-4; Tyr-Gly-Gly-Phe-Met-Thr-Ser-Glu-Lys-Ser-Gln-Thr-Pro-Leu-Val-Thr-Leu-OH.] while decreasing stress-enhancing hormones [glucocorticoids, catecholamine, growth hormone and prolactin], including cortisol, and adrenaline. Brain Chemistry & Your Mood: 4 Hormones That Promote Happiness [serotonin, dopamine, endorphins, and oxytocin]. It also reduces overall blood pressure and because you typically smile when you're happy, the muscles used trigger your brain to produce more endorphins—the chemical that relieves pain and stress. Passing on good feelings via smiling can help others feel less pressured and relieve some of their stress, which ultimately helps productivity. Relaxed people are also more open to new ideas and are more trusting of those that have made them feel relaxed. Smiling indicates to others that you are approachable.^[2]

When our smiling muscles contract, they fire a signal back to the brain, stimulating our reward system, and further increasing our level of happy hormones, or endorphins. In short, when our brain feels happy, we smile; when we smile, our brain feels happier. Smile allows its main character to find a solution that reinforces the message it's trying to build: mental health is a serious issue, and we need to treat it properly. In an ideal smile, 100 percent of your central and lateral upper incisors and your canines should be visible, Hilton says. Usually your upper premolars and part of your first molar should be on display. Men tend to show less of their upper teeth (hence the expression “stiff upper lip”). Science has shown that the mere act of smiling can lift your mood, lower stress, boost your immune system and possibly even prolong your life. Smiling can be an involuntary response when we feel positive emotions like love, and joy. Alongside this, it can also be an intentional, conscious choice to brighten a dreary day. Happiness is synonymous with smiling.^[3]

Smiling is a universal expression of happiness and joy. It is a simple gesture that can lighten up any situation and make people feel better. We'll explore 10 interesting facts about smiles, including why we do it, how it affects our health, and how it can be contagious. From the science behind smiling to the power of a grin, these facts will make you think twice about your own smile and the ones you see around you. So get ready to learn more about the fascinating world of smiles!^[4]

Ten facts of smile:

1. Smiling is the first expression we learn. Some might call us smiling experts! Did you know that smiling is our first expression that we ever learn? When babies are born, they can already smile!
2. Endorphins are released when you smile. Endorphins are chemicals released into the brain. They are a natural painkiller and help your mood. Keep smiling because when you do, endorphins are released into your brain! Learn more about your brain here!

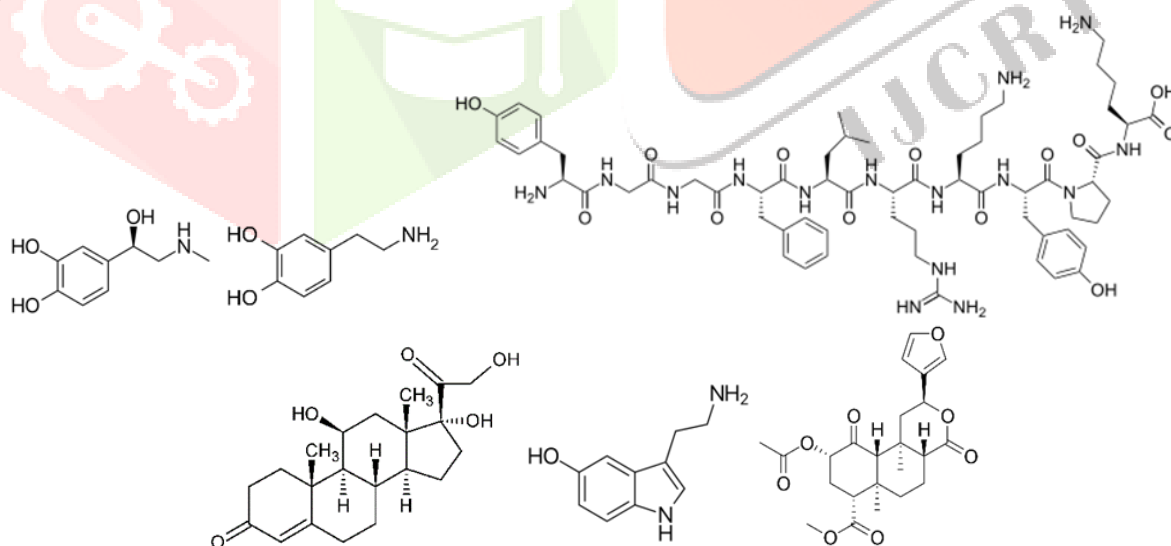


Figure-2: Neurohormones for good mood: Adrenaline, Dopamine, Endorphin, Cortisol, Serotonin & Salvinorin A

3. Smiling can help to put you in a better mood. If you're in a bad mood, studies have shown that smiling can help. Sometimes, if you can force out a smile it will boost your mood! Next time you're feeling sad, why don't you try it and see? Embed from Getty Images

4. Smiling is contagious! Smiling is very contagious. We bet you have caught one before. If your friends are laughing, it's very hard to stop yourself from laughing too!

5. There are 19 different types of smiles. Did you know that there isn't just one type of smile?

However, only 6 of those 19 smiles are for happiness. Some of the smiles that aren't for happiness are the embarrassed,

miserable and fake smile. We think we will stick to the happy ones!

6. Children smile more than adults! According to studies, children laugh around 300 – 500 times a day! Adults laugh around 17.5 times day. That is a lot of smiling you must be doing!

7. You can communicate all over the world with a smile! There are lots of different languages spoken across the world. However, there is one thing that we can use to communicate with anyone and that's a smile!

8. Smiling can boost your immune system. According to some scientific studies, smiling and laughing can boost your immune system. It might actually help your health and stop you from getting ill as often.

9. If you smile, people will think you are more approachable! If someone is smiling then it makes them more approachable. Imagine if you saw someone doing a grumpy face – you might not want to talk to them!

10. We're not the only ones who smile! Smiling is a human expression which comes naturally to us.

Apes, monkeys and chimpanzees smile too! When they are tickled they have been known to laugh.^[5]

Pharmacology: Laughter can: Stimulate many organs. Laughter enhances your intake of oxygen-rich air, stimulates your heart, lungs and muscles, and increases the endorphins that are released by your brain. Activate and relieve your stress response. It's true: laughter is strong medicine. It draws people together in ways that trigger healthy physical and emotional changes in the body. Laughter strengthens your immune system, boosts mood, diminishes pain, and protects you from the damaging effects of stress. Laughing increases the brain's production of endorphins — the natural way your body relieves pain, reduces stress and boosts mood. Laughing also increases your intake of oxygen-rich air and blood flow and circulation, which can improve brain health. Laughter is known to be an effective antidote to pain, stress, and conflict. Nothing can work faster to restore someone's mental and physical health than a good laugh. It also helps us stay focused by lightening our burdens and connecting us to others. Laughter has the power to heal the mind and body of a person. In the 1300s, Henri de Mondeville, a professor of surgery, propagated post-operative therapy with humor.^[6] Norman Cousins, a journalist and a professor, also initiated this trend when he developed his own “treatment,” based on mood elevation through laughter. It improves positive emotion, strengthens the immune system, stimulates cognition, reduces stress, and improves positive coping. Here are a few ways to incorporate laughter into your daily life. That good feeling when you smile or laugh triggers a chemical reaction in your brain, which releases small proteins called neuropeptides. These tiny molecules maintain immune tolerance and may help fight potentially serious illnesses. Life can be hectic so make sure to include humor in your daily routine. Laughter enhances your intake of oxygen-rich air, stimulates your heart, lungs and muscles, and increases the endorphins that are released by your brain. Activate and relieve your stress response. When you laugh, your heart rate increases, and you take many deep breaths. This mean that more oxygenated blood is circulated through your body – improving your vascular function.

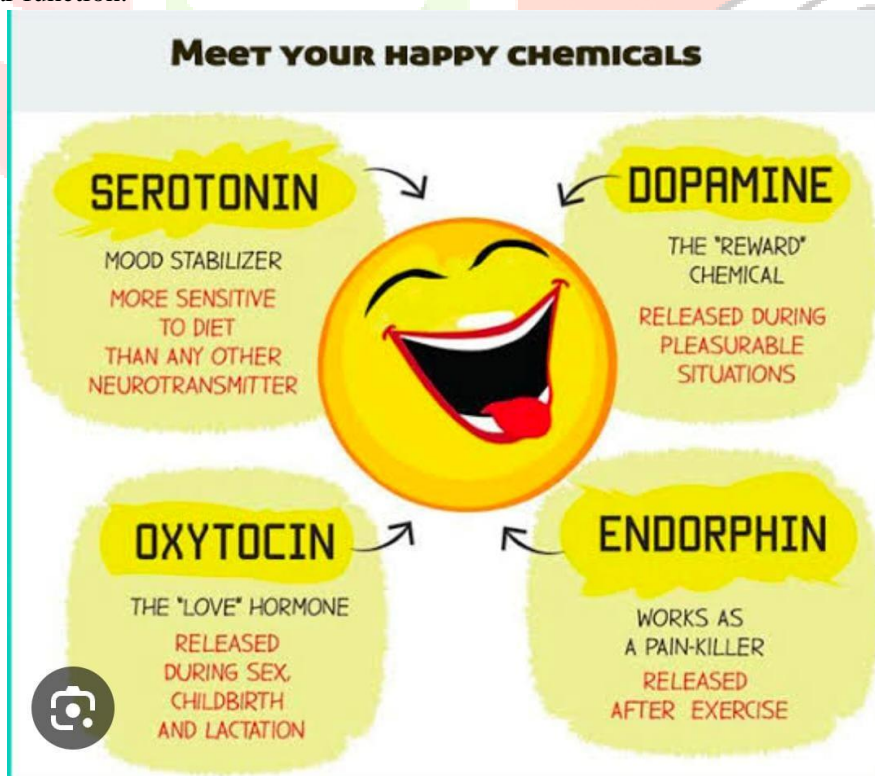


Figure-3: Facial expressions

Prevents heart disease. Improved vascular function and circulation can also help reduce your risk of a heart disease diagnosis. We don't laugh because we're happy – we're happy because we laugh.” – William James. If you describe someone as a laugh or a good laugh, you like them because they are amusing and fun to be with. Laughter is a pleasant physical reaction and emotion consisting usually of rhythmical, often audible contractions of the diaphragm and other parts of the respiratory system. It is a response to certain external or internal stimuli. Laughter is a pleasant physical reaction and emotion consisting usually of rhythmical, often audible contractions of the diaphragm and other parts of the respiratory system. It is a response to certain external or internal stimuli. Laughter can rise from such activities as being tickled, or from humorous stories or thoughts.^[7] Most commonly, it is considered an auditory expression of a number of positive emotional states, such as joy, mirth, happiness, or relief. On some occasions, however, it may be caused by contrary emotional states such as embarrassment, surprise, or confusion such as nervous laughter or courtesy laugh. Age, gender, education, language, and culture are all indicators as to whether a person will experience laughter in a given situation. Other than humans, some other species of primate (chimpanzees, gorillas and orangutans) show laughter-like vocalizations in response to physical contact such as wrestling, play chasing or tickling. Laughter is a part of human behavior regulated by the brain, helping humans clarify their intentions in social interaction and providing an emotional context to conversations. Laughter is used as a signal for being part of a group—it signals acceptance and positive interactions with others. Laughter is sometimes seen as contagious, and the laughter of one person can itself provoke laughter from others as a positive feedback. The study of humor and laughter, and its psychological and physiological effects on the human body, is called gelotology. Gelotology is the study of laughter and its effects on the body, from a psychological and physiological perspective. Its proponents often advocate induction of laughter on therapeutic grounds in alternative medicine.^[8]

Neuropharmacology: A link between laughter and healthy function of blood vessels was first reported in 2005 by researchers at the University of Maryland Medical Center with the fact that laughter causes the dilatation of the inner lining of blood vessels, the endothelium, and increases blood flow. Drs. Michael Miller (University of Maryland) and William Fry (Stanford) theorize that beta-endorphin-like compounds released by the hypothalamus activate receptors on the endothelial surface to release nitric oxide, thereby resulting in dilation of vessels. Other cardioprotective properties of nitric oxide include reduction of inflammation and decreased platelet aggregation.^[9]

Laughter has various proven beneficial biochemical effects. It has been shown to lead to reductions in stress hormones such as cortisol and epinephrine. When laughing, the brain releases endorphins that can relieve some physical pain. Laughter also boosts the number of antibody-producing cells and enhances the effectiveness of T-cells, leading to a stronger immune system. A 2000 study found that people with heart disease were 40 percent less likely to laugh and be able to recognize humor in a variety of situations, compared to people of the same age without heart disease.^[10]

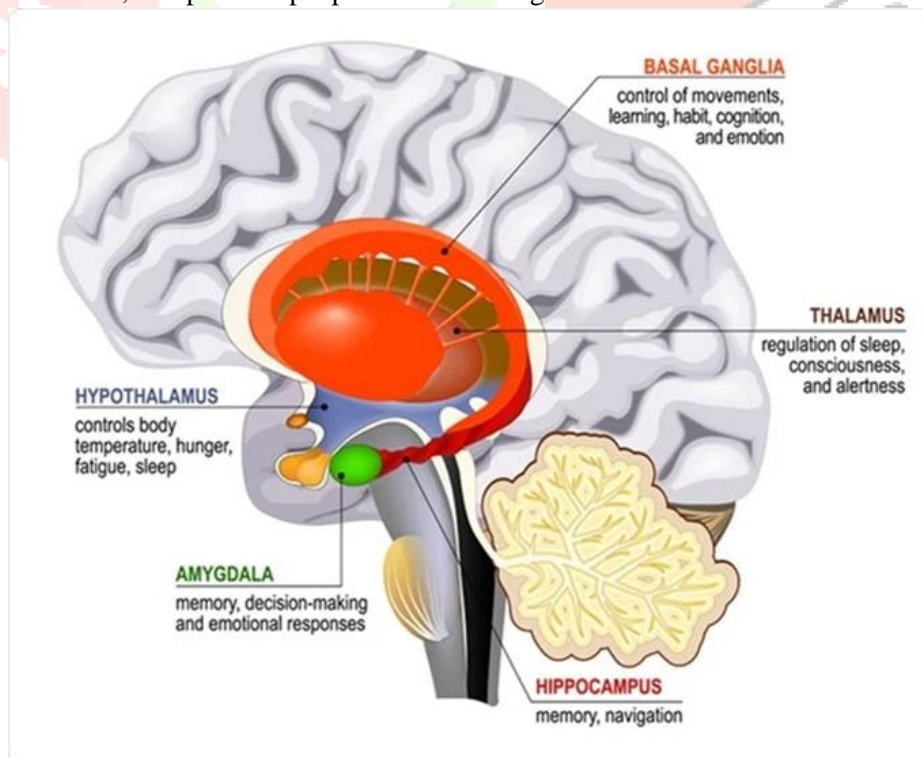


Figure-4: Brain anatomy

Brain: Neurophysiology indicates that laughter is linked with the activation of the ventromedial prefrontal cortex that produces endorphins. Scientists have shown that parts of the limbic system are involved in laughter. This system is involved in emotions and helps us with functions necessary for humans' survival. The structures in the limbic system that are involved in laughter are the hippocampus and the amygdala. The December 7, 1984, Journal of the American Medical Association describes the neurological causes of laughter as follows:

"Although there is no known 'laugh center' in the brain, its neural mechanism has been the subject of much, albeit inconclusive, speculation. It is evident that its expression depends on neural paths arising in close association with the telencephalic and diencephalic centers concerned with respiration. Wilson considered the mechanism to be in the region of the mesial thalamus, hypothalamus, and subthalamus. Kelly and co-workers, in turn, postulated that the tegmentum near the periaqueductal grey contains the integrating mechanism for emotional expression. Thus, supranuclear pathways, including those from the limbic system that Papez hypothesised to mediate emotional expressions such as laughter, probably come into synaptic relation in the reticular core of the brain stem. So while purely emotional responses such as laughter are mediated by subcortical structures, especially the hypothalamus, and are stereotyped, the cerebral cortex can modulate or suppress them."^[11]

Some drugs are well known for their laughter-facilitating properties (e. g. ethanol and cannabis), while the others, like salvinorin A (the active ingredient of *Salvia divinorum*), can even induce bursts of uncontrollable laughter. Salvinorin A [CAS: 83729-01-5; methyl (2S, 4aR, 6aR, 7R, 9S, 10aS, 10bR)-9-(acetyloxy)-2-(furan-3-yl)-6a,10b-dimethyl-4,10-dioxododecahydro-1H-naphtho[2,1-c]pyran-7-carboxylate] is the main active psychotropic molecule in *Salvia divinorum*. Salvinorin A is considered a dissociative hallucinogen. It is structurally distinct from other naturally occurring hallucinogens (such as DMT, psilocybin, and mescaline) because it contains no nitrogen atoms; hence, it is not an alkaloid (and cannot be rendered as a salt), but rather is a terpenoid.^[12] It also differs in subjective experience, compared to other hallucinogens, and has been described as dissociative. Salvinorin A can produce psychoactive experiences in humans with a typical duration of action being several minutes to an hour or so, depending on the method of ingestion. Salvinorin A is found with several other structurally related salvinorins.

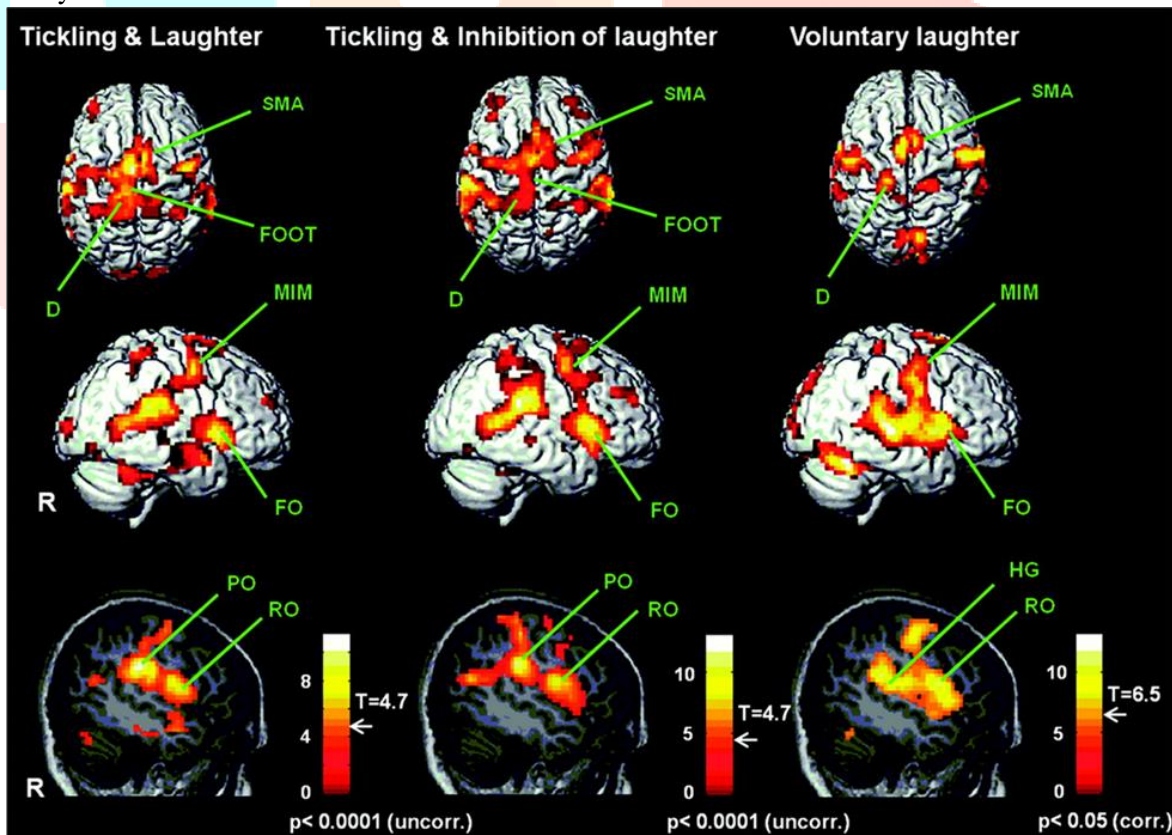


Figure-5: Scanning Electron Micrograph of Brain

Salvinorin is a trans-neoclerodane diterpenoid. It acts as a kappa opioid receptor agonist and is the first known compound acting on this receptor that is not an alkaloid. Salvinorin A is a trans-neoclerodane diterpenoid with the chemical formula $C_{23}H_{28}O_8$. Unlike other known opioid-receptor ligands, salvinorin A is not an alkaloid, as it does not contain a basic nitrogen atom. Salvinorin A has no action at the 5-HT_{2A} serotonin receptor, the principal molecular target responsible for the actions of 'classical' psychedelics such as LSD and mescaline. Salvinorin A has also been shown to have effect on cannabinoid CB1

receptors. It significantly increases prolactin and inconsistently increases cortisol. It causes dysphoria by stopping release of dopamine in the striatum.^[13] Salvinorin A increases activity of DAT [dopamine transporter] while decreasing activity of SERT [serotonin transporter]. Laughing too hard may prevent adequate breathing or cause a person to stop breathing, depriving their body of oxygen. This type of death is likely with a nitrous oxide overdose. Nitrous oxide [N₂O] is commonly known as laughing gas, an inhaled anesthetic used during some dental procedures. When you laugh, your heart rate increases, and you take many deep breaths. This means that more oxygenated blood is circulated through your body – improving your vascular function. Prevents heart disease. Improved vascular function and circulation can also help reduce your risk of a heart disease diagnosis. When you smile, your brain releases tiny molecules called neuropeptides to help fight off stress.^[14] Then other neurotransmitters like dopamine, serotonin and endorphins come into play too. The endorphins act as a mild pain reliever, whereas the serotonin is an antidepressant. Feeling weak from laughter appears to be from the temporary inhibition of the motor neurons—the cellular wires that connect your brain to your muscles—around the body. How do we know this? By testing a leg reflex—otherwise known as the H-reflex—when showing volunteers movies. Start to laugh, and the reflex goes away. Cataplexy is a sudden and transient episode of muscle weakness accompanied by full conscious awareness, typically triggered by emotions such as laughing, crying, or terror. Cataplexy, a physical feature of narcolepsy, is characterized by transient episodes of voluntary muscle weakness precipitated by intense emotion. Subjective descriptions of cataplexy can assist in the identification of narcolepsy, as this feature is almost unique to the disorder.^[15]

Conclusion: In modern society, fierce competition and socioeconomic interaction stress the quality of life, causing a negative influence on a person's mental health. Laughter is a positive sensation, and seems to be a useful and healthy way to overcome stress. Laughter therapy is a kind of cognitive-behavioral therapies that could make physical, psychological, and social relationships healthy, ultimately improving the quality of life. Laughter therapy, as a non-pharmacological, alternative treatment, has a positive effect on the mental health and the immune system. In addition, laughter therapy does not require specialized preparations, such as suitable facilities and equipment, and it is easily accessible and acceptable. For these reasons, the medical community has taken notice and attempted to include laughter therapy to more traditional therapies. Decreasing stress-making hormones found in the blood, laughter can mitigate the effects of stress. Laughter decreases serum levels of cortisol, epinephrine, growth hormone, and 3,4-dihydrophenylacetic acid (a major dopamine catabolite), indicating a reversal of the stress response. Depression is a disease, where neurotransmitters in the brain, such as norepinephrine, dopamine, and serotonin, are reduced, and there is something wrong in the mood control circuit of the brain. Laughter can alter dopamine and serotonin activity. Furthermore, endorphins secreted by laughter can help when people are uncomfortable or in a depressed mood. Laughter therapy is a noninvasive and non-pharmacological alternative treatment for stress and depression, representative cases that have a negative influence on mental health. In conclusion, laughter therapy is effective and scientifically supported as a single or adjuvant therapy. On a physiological level, laughter boosts the feel-good hormones in the body including serotonin, dopamine and oxytocin, and releases endorphins.

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