

## **The study of Laughter**

Gelotology (from the greek gelos meaning laughter) is the study of laughter and it's effects on the body, from a psychological and physiological perspective.

For my EPQ project I'm interested in researching the effects of laughter on a human's mind and life.

I intend to examine the various applications of laughter theory, practices and how it is proven to benefit patients, sometimes even prolonging their lives.

I am also interested in analyzing how different cultures have different approach to laughter and why some judge it positively and some do not.

We all believe that to laugh we need to have a sense of humor, to be capable to perceive, relate a situation, evaluate a situation weather its entertaining or not. Children don't laugh because they have a sense of humor but because it's in their nature to be joyful. During the phase of adolescence we develop the mental ability to judge bringing us from a state of joy to the state of conditional laughter. Impeccably, adults need to use techniques like the laughter yoga to unblock and remove the thick layers of mental clogs, created by themselves, their family and their society because under these barricades we have an unbelievable ability to laugh unconditionally. Once you get rid of the obstacles, laughter can easily spill out as it naturally would. Therefore Laughter doesn't only consist in the physical act of laughing but also to wake the interior child within us.

I have therefore divided this analysis in the following parts:

- A) The effects of laughter on human body
- B) The effects of laughter on human mind
- C) The approach to laughter by different cultures
- D) The laughter Yoga
- E) How laughter therapy is used in different fields
- F) Criticisms of laughter yoga

### **The effects of laughter on human body**

From scientific point of view I would like to study what happens in our cells as we laugh, what are the positive effects that in same case can so drastically heal us.

Nowadays, stress is a dangerous killer, and most illnesses are linked to or cause by stress. When we are stressed our breathing patterns become irregular and weaker due to our biochemical changes.

Stressed people may unconsciously hold their breath which leads to an accumulation of carbon dioxide in the blood. The respiration decreases the level of carbon dioxide in the lungs, therefore reducing the risk of pulmonary infection. it stimulates the para sympathetic nervous system which is the cooling branch of the autonomic nervous system and is the opposite of the sympathetic stress arousal system. Over 70-80% of illnesses are linked to stress. Including cardiovascular problems such as high blood pressure, heart disease and heart attacks; arthritis, asthma and other allergic conditions, diabetes, cancer, chronic fatigue, anxiety attacks, mood swings, psychological distress, depression, sleep problems, eating disorders peptic ulcers, poor immune function, chronic pain, attention deficit hyperactivity disorder (ADHD), cold, flu, headaches and migraines, alcoholism and drug abuse and more. Laughter is an instant stress relief. It has been scientifically proven to reduce the level of stress hormones like cortisol and epinephrine and brings positive

emotions. Stress and negative emotions reduce communication skills and the motivation to communicate. Therefore Laughter perfectly counters the negative aspects of stress and increase your desire to communicate and act.

This field of study was pioneered by William .Fry psychiatrist of Stanford University, California, considered the father of Gelotology. He began examining the physiological effects of laughter in the 1960's.

Fry also demonstrate that laughing is also a physiological exercise and can lower the probability of getting respiratory infections. He demonstrated that laughing favors the production of endorphin, and analgesics.

in 1979 Norman Cousins published the book "Anatomy of an illness as perceived by the patient" in which he describes the benefits of humor and other positive emotions that he experienced himself as he was ill in 1964 and discovered that 10 minutes of laughing would guarantee him two hours of sleep without pains.

One of Fry's studies confirms that twenty seconds of intense laughter, can double the heart beat for a period of three to five minutes, and stimulates the majority of the physiological systems in the human body:

The central and peripheral nervous system,  
skeletal muscle system,  
respiratory system,  
blood and circulatory system,  
water and salt homeostasis system,  
urinary system,  
endocrine system,  
reproductive system,  
gastrointestinal system,  
metabolism,  
and thermoregulation

Laughter is also a form of excersise. According to Dr. William Fry 10 minutes of correct laughter is equal to 30 minutes on the rowing machine. This is in respect to cardiopulmonary endurance, in fact 20 minutes of Laughter Yoga can bring very similar results to those of exercising with gym machines.

Laughing gives us the amount of oxygen we truly need for a wellbeing. Our negative emotions restricts the amount of oxygen intake and causes shallow chest breathing. Laughter Yoga ( so laughter) exercises are constructed in order to make our exhalation longer and deepen our breathing through the diaphragm. As I said earlier, this helps in purifying the lungs of residual air and increasing overall oxygen in our cells. Each cell in our body needs oxygen to effectively of it's job therefore without respiration ( I repeat, laughter is a form of respiration) we do not function to our fullest potential.

Laughter aids our blood circulation. Every physical disease or mental issue constrict circulation and decelerating the body system. Researches show that laughter provokes an

'internal jogging' which stimulates and accelerates the digestive and lymphatic systems. It also increases a circulation which flushes us of waste products.

Dr. Lee Berk, Loma Linda University Medical Center was inspired by Norman Cousins, with his team of researchers in the field of psico-neuro-immunology carried on some experiments; they divided in two groups, a sample of their patients that had had a heart attack and applied the standard medical therapy to both, with the difference that they showed the second group 30 minutes of comedies a day. After a year the second group had less heart arrhythmia, lower blood pressure, less stress hormones (cortisol), needed less medicals and showed a lower percentage of ( 20% ) of heart attack, meanwhile the first group showed a higher percentage of (50%) heart attacks.

A study conducted in 2006 in Bangalore on a of 200 IT highly stressed professionals, showed that at the end of a period of 18 days, in the Laughter Yoga group there was a significant drop in heart rate, in cortisol level, blood pressure, with a 17% increase in positive emotions and 27% decrease of negative emotions and of Alexithymia by 9%.

The effects of laughter on human mind

Dr. Hunter (Patch) Adams, MD founded and is director of Gesundheit Institute and holistic medical institution. He has inspired thousands of medical clowns all over the world that have brought enjoyment and laughter in many hospitals around the world, practicing his idea: " curing should be an exchange of love between human beings rather than an economical one" , " doctors should treat people not disease!"

Dr. Steve Wilson, M.A., C.S.P. is a Psychologist, Joyologist — "Helping people and organizations increase productivity, get the absolute most from themselves...and love every minute of it." Dr Wilson is a Joyologist, which uses Laughter to as his technical method to aid Business, Healthcare and Education. A Business man aided by Dr. Wilson commented "I have worked with hundreds of organizations , small & large businesses, and corporations to teach them how to form an organization where people are eager to improve performance and profitability. Positive environments change the way people feel about themselves and their work. A modest 15% increase in morale can create a 40% increase in productivity. If you want to have a business where people are laughing at stress, where people get more work done and they do it faster, where everyone contributes to improvement, where waste is minimized, where people do things right the first time, and where the joy of accomplishment becomes the most desired reward get in touch with Steve Wilson". Dr Wilson discusses how the absence of laughter can lead to severe mental illnesses and how potent it is as a device to cure someone. To Dr. Wilson, laughter is "a moment of perfect balance between inner and outer worlds; a fast dip into the unconscious that the whole self revels in."

<http://www.stevewilson.com/Self-Esteem/laughing.cfm>

The psychologist William James in 1884 noticed that "the mental state ( negative or positive) is mirrored in an expression or behavior of the body".

Another point proving the significance of constant and repetitive laughter is the immense joy produced by the neurological changes induced by frequently practicing laughing

exercises, hand clapping on rhythms and repeating joyous phrases, our brain develops new neurological connections and neuropeptides and hormones in the organism. In the NLP ( Neuro Linguistic Programme ) this phenomena is called 'anchor' because through a positive anchor, the mind can experience complete joy with the chemical reactions caused by the anchor.

The approach to laughter by different cultures

Indeed, in western cultures, the laughing of an adult, especially if repetitive and frequent, is considered almost an inappropriate action, far from the concept of being a respectable, serious or decent person. As a matter of fact, the Latin saying goes as follows "Risus abundat in ore stultorum" meaning that 'laughter is abundant on the mouths of the stupid'. Unfortunately this vision, ignored for thousands of years the incredible benefits of laughter. However, in the modern mentality there is a greater appreciation of eastern practices, like yoga and meditation which brings one to relaxation and being conscious of the moment lived: "carpe diem", "hic et nunc" (here and now) and the invitation to regain our infant energies and lightheartedness, with the motto "find the child within you". Thence, practicing the benefits of laughter, discovered by the above mentioned scientific research, may appear to the reader or practitioner, as quite naive and silly yet it is in this simplicity itself, that the power of laughter treasures lie. In fact, the operations in yoga of laughter, surprise and engage us.

Traditionally, for cross-cultural comparative approaches we can rely on the anthropologists. Yet the ethnographic record contains very few descriptions of laughter. Most often, all the ethnography says is that the people laughed at this or that, and there is no account of what their laughter was like. Why this paucity of ethnographic data about laughter? I can think of several reasons, most of which I don't have time to go into here, but the most relevant one is this: since anthropologists, like the rest of us, assume that laughter is universal, they do not

look for cultural differences. Detailed descriptions only appear when they encounter styles of laughter that is markedly different from what they consider normal. (Seiler, 2005 #2510):234-37). Ethnographers simply report laughter rather than describing it; moreover, they rarely go on to examine what the laughter means or to ask why an audience laughs. It is as if the meaning of laughter is obvious. In part, this attitude stems from the belief that laughter is universal. Further, laughter itself discourages analysis. When we are overcome by laughter, it seems we are unable to observe others or to question or analyze what is going on (Katz 1999); (Chafe 2007). Laughter thus helps construct the illusion of shared collective experience; we assume that when we laugh with others we are all laughing for the same reason. Accordingly, when ethnographers see others laughing, it is easy to assume that we know what is going on here; no analysis or explanation is necessary. Similarly, expressions like —non humorous laughter assume what needs to be proved; they are based on *a priori* definitions of what humor is; therefore laughter cannot be used to indicate the presence of humor. (Turnbull 1962).

### **Bushman laughter**

This is what happened to Colin Turnbull in his fieldwork among the —Pygmies of southern Africa (now usually referred to as Bushmen or Mbuti). Turnbull noticed that the Mbuti had a distinctive way of expressing amusement:

When Pygmies laugh, they hold onto one another as if for support, slap their sides, snap their fingers, and go through all manner of physical contortions. If something strikes them as particularly funny they will even roll on the ground. . . The Pygmy ... likes to laugh until tears come to his eyes and he is too weak to stand. He then sits down or lies on the ground and laughs still louder (1962:56). I submit to you that if we saw adults laughing in this way in our own society, we would not simply assume that they were highly amused. Instead, we would probably think them a little crazy. In any case, we would be judging the Bushman style of laughter in terms of our own preferred cultural laughter style.

## Tamil laughter

Another example of a cultural laughter style comes from south India. In her book *Stigmas of the Tamil Stage* Susan Seizer describes the audience laughter during a slapstick comedy scene between a husband and wife:

(Seizer 2005)234-37; 267-68).

—Everyone (apart from me) laughed, she writes. While it seemed at times uncontrollable and uncontrolled, coming in big breaking guffaws, it was nevertheless contextually normal and regular: laughing out loud was the proper response. From where I sat, as usual among the women in the audience, I was surprised to see that rather than the usual shy giggles, women too laughed openly at the scene

Video of scene at <http://stigmasofthetamilstage.scrippscollege.edu>.

Although it seemed to be uncontrolled, Seizer finds that the Tamil audience's laughter was actually very regular. It was —quite regularly timed to the stage action; moreover, the onstage musicians matched the rhythm of the laughter with percussive beats. —The sound track helps keep the audience on track with the action, she notes: —Pow laugh clang laugh whoosh laugh slam laugh (268).

Gail Jefferson made a similar discovery about laughter when she transcribed a recording of the telling of a mildly dirty joke by some American speakers. Although the laughter looked to be out of control, and although participants said things like,

—She can't help but laugh, a detailed transcription of the event showed that the laughter was deliberately inserted into the utterance. In other words, even when people appeared to be —done by humor, they are doing laughter.  
(Jefferson 1985). (Graham et al. 2006).

### **Finally, Samoan laughter**

More than 130 thousand New Zealanders identify as Samoans, making them the largest and most visible Pacific Island ethnic group in New Zealand. Their visibility is increased by the fact that the most of them live in Auckland and because Samoan language, culture, and family ties remain strong for most people in this group. New Zealanders and reformed that grew up around Samoans and hearing Samoan laughter, think that it has a markedly different style from Anglo American (or Pakeha New Zealand) laughter: even when the laughers are men, the Samoan style tends to be distinctly hi-pitched, almost *falsetto*.

### The Laughter Yoga

Dr. Madan Kataria, Mumbai, impressed by the researches of his predecessors on the benefits of laughter, wrote an article entitled “ Laughing- the best medicine” and like doctor Hunter (Patch) Adams, began a regular practice of laughter that combined with breathing exercises brought to life the innovative therapy of ‘Laughter Yoga’.

Dr. Madan Kataria decided to test the impact of laughter on himself and others, by organizing with a group of friends an activity of telling each other jokes at seven am in a park everyday. When the friends ran out of jokes and the group was about to drift apart Dr. Kataria reflected upon a way to continue the laughter cycle and looking back at Dr. Fry's studies, and came across the discovery that: ‘ our body does not distinguish between authentic laughter and simulated laughter, both of them produce the same chemistry of happiness’. The next day he convinced his friends to laugh for a minute and they got surprised with the results. For some the ‘fake’ laughter became authentic. Kataria began with elements of role-play that he had learnt while acting. Laughter is contagious therefore the whole group followed and ‘Laughter Yoga’ came to life, through simple and apparently silly exercises.

Dr. Kataria and his wife Madhuri Kataria (co- founder of the Laughter Yoga) noticed the similarities between laughter and the exercises of pranayama therefore they incorporated some elements taken from this ancient form of yoga ( pranayama ). Laughter yoga as it's known today was the result to this, which is: a mixture of deep yogic respiration, stretching, the clapping of hands, body movements, exercises made to stimulate laughter and infantile jocosity and musical rhythmic sounds such as “ ho ho ha ha ha”. These techniques, combined with the group dynamics bring to an unconditional laughter often generating a to powerful emotions releases a full joy and a light serenity that can last for days A session of Laughter yoga can end with the “laughter meditation”. As far as we know, laughter is unique to human beings--a flash of consciousness, a clue to who we are. From Gloria Steinem's "Revolution From Within: A Book of Self-Esteem," Little.

Today, Laughter yoga is an international phenomena, with thousands of clubs in different countries: India, USA, Canada, Australia, UK, Franca, Germany, Italy, Belgium, Swiss, Sweden, Norway, Denmark, Hungary, Ireland, Netherlands, Finland, Mexico, Basil, Singapore, Japan, Korea, Indonesia, Malaysia, Vietnam, Taiwan, Hong-kong, Dubai, Iran.

Initially, the laughter is stimulated by a physical exercise, keeping eye contact with the others in the group to develop jocosity. In the majority of cases, the group rapidly reaches spontaneous and contagious laughter. Laughter yoga is the only technique that allows adults to reach an intense laughter without involving the cognitive as it doesn't depend on the intellectual system, which usually tends to block natural laughter. It has been proven scientifically that twenty minutes of laughter are sufficient to develop important physiological benefits.

The word Yoga derives from sand script as Yup, which means integrating and harmonizing; having control over your own life, integrating different aspects of life, balancing body and mind, spirit and society. There are various types of Yoga; Hatha Yoga (equilibrium of energies), Karma Yoga (based on altruism and generosity), Bhakti Yoga (based on devotion), etc. However, kataria was interested in Pranayama in particular which is the ancient science of respiration. This type of respiration has an immensely powerful and immediate affect on the physiology and had been used for over four thousand years to have an influence on the body, the mind and the emotions.

According to the philosophy of yoga, we live because the cosmic energy from the universe flows in our bodies through respiration which acts as the connecting window therefore this is known as 'Vital Energy' or Prana. Unfortunately, due to stress or negative emotions, our respirations becomes irregular and limited which then influences the flow of the Prana through the organism.

Laughter is a form of respiration which is why a correct respiration is majorly important. Medically, the most important element of respiration is oxygen. Dr. Otto Warburg, nobel pries and president of the institute of cellular physiology said " The techniques of deep respiration increase the quantity of oxygen in the cells, and represent the most important factors to live a life full of energy and health. When cells gain enough oxygen, cancer cannot take root.

The main element of yogic respiration (Pranayama) consists in exhaling for longer than inhaling, to clean your lungs from residual air which contains carbon dioxide and replace it with fresh air which contain higher levels of oxygen. A normal inhale only fills 25% of the whole pulmonary capacity and the remaining 75% remains full of stagnating air. Moreover, laughter is the most rapidly achievable method for prolonged exhalation that leads to the purification of the lungs.

Laughter yoga concentrates on training the diaphragm: you laugh and breathe using your abdominal muscles. Most exercises focus on activating the parasympathetic system, which is the calming part or the autonomous nervous system. In moments of stress the sympathetic system activates, which is the opposite of the parasympathetic system and learning to move your diaphragm is a large aid to deal with stress. Due to stress we block the diaphragm causing our breathing to become superficial therefore the carbon dioxide accumulates and stimulates the sympathetic system.

The constance of this practice can bring to mental changes other than physical as it is a group activity and the atmosphere of positivity leads to flipping one's perspective to life and mental state drifting from " I want, I get, I think of myself " to " I love, I take care of others, I give" with an increase in empathy and compassion.



Laughter yoga works on the connection of the mind and body to change one's mental state through voluntary movements. This is incredibly potent to the point of helping thousands of people around the world to fight depression.

In a larger context the purpose of Dr. Kataria is to spread global joy through these laughter clubs that multiply the positive attitude to life given by the laughter techniques, improving the social relations from the family circle to a wider variety of acquaintances thus spread feelings of peace all over the world.

“ when you laugh, your mental state changes, and when you change, the whole world changes around you” ( Dr. Madan Kataria )

As we all know, depression is an incredibly common disease and in fact the number one disease. Depression carries a large amount of symptoms which have affect on our ability to work, study, sleep, and eat. It is very common for people who have suffered long-term depression to recover through laughter, even after years of anti-depressant medication, indeed it had healed thousands over the world through Laughter yoga. Due to these benefits, it is also used as a painkiller.

Moreover, it is used as a pain killer. Once we detect pain, we automatically contract wherever the pain derives from, only increasing the amount of pain. However laughter releases endorphins, which are natural opiates that help reduce the intensity of a pain. In 1989, the staid "Journal of the American Medical Association" published this conclusion from a Swedish study: "A humor therapy program can improve the quality of life for patients, Laughter has an immediate symptom-relieving effect."

John Cleese visited Mumbai India, pulled by the curiosity of how Laughter Yoga works. Cleese attended large sessions with Madan Kataria himself , which he then interviewed. Cleese is most stupefied with how rapidly a forced laughter becomes real and how simple it is compare to how when we search for valid reasons to laugh to. Kataria invited him to observe a session with rapists, murderers and robbers. Kataria says “ they have a lot of anger, sadness and suppressed feeling inside them being far from the family and laughter helps them release these feelings and lighten themselves” after the session Cleese says “ I was struck by how laughter connects you with people, it's almost impossible to maintain any kind of distance or any sense of social hierarchy when you are howling with laughter”

**In a TEDMED presentation, Dr. Madan Kataria cites scientific research on Laughter by Lee Berk at Loma Linda University. In an interview Berk explains that adults loose their laughter compare to children who have an average of 400 laughs a day when an adult only have an average of 15 laughs a day.**

A study was conducted in 2007 in the United States, which observed the affect of Laughter Yoga in the work place. Self-efficiency is believed to be the key for the functioning in a work place as it means being organized and manage situations therefore the personal ability strongly affects the overall work performance of the whole team. Each workers personal self-efficiency was measured before they introduced laughing yoga for 15 minutes a day. The results were highly successful in all areas, improving the overall performance with positive changes of 100%.

As we can see the positive effects for our body and mind are several and significant. (1) (2)

## **How Laughter Therapy is used in different fields**

**The 21 October 2014, I attended a seminar in the Elsa Morante's cultural centre, dedicated to how laughter can better our society. In this seminar, various people presented how their lives changed due to Laughter techniques or laughter yoga, therefore in which different sectors they chose to utilize it.**

**Loredana Zeugma and Patrizia Gugliotta- "Laughing with the handicap".**

**These women, have been volunteering for the past five years, to introduce laughter techniques to disabled people as it has been helping them bond with family and friends , boost their confidence and inter-relate with others.**

**Clown therapy. The international forum of comical therapy is a group that chose to expose laughter to the outdoor therefore streets and parks, to present and introduce it to as many people as possible. This attracted many people around the world and many chose to begin laughter yoga.**

**In Italy, every educational activity in the socio-medical field is recognized by a scientific committee within the Ministry of Health. Ancis Politeia Onlus is a NGO active in this respect.**

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**Vocational courses for doctors and sanitary staff oriented to alleviate cases pf emergency beavuse bringing a good mood accelerates the revoceries.**

**Rodolfo Matto e Loretta Bert - "An escaping took in prison" , Prisons - use of communication in a place where people feel dead and forgotten. "in prison there is the wall, smashing doors and silence" , a 17 year old that did not want to participate at first, then said " when I laugh I don't see the prison's bars" . The women there were so hardened that they could not cry or laugh, however after laughter, they softened. This man also worked in judical psychiatric hospitals for life sentenced prisoners so called " living hell" , : laughter is used to aid them to find a purpose in their lives and to seek for what is not hell around them.**

**M.Ausilia Vaccari worked with children in an italian private school, replacing physical education with Laughter Yoga every morning. This lead to a higher concentration and atmosphere of joyfull harmony throught the day.**

**Danny Sing is an english teacher who uses laughter as a successful tool to teach. The benefits are that the general embarrassment is lowered because after 15 minutes of laughter no one is timid. The creativity is increased and provoked through various exercises of laughing. It improves the harmony and group equilibrium (team-building). Moreover, it enriches the vocabulary of the participants as the laughter is only a tool.**

**Arianna Albertini and Elisabetta Mecci , "Laughter use between those suffering of cancer" nurse in the hospital Regina Margherita of Rome since 3 years with excellent results, there she works with cancer patience with techniques of relaxment through Yoga and Laughter to find themselves and for an interior growth. A patient presented her successful experience by saying " I found a major balance**

in myself and in relations with others, like in farmathologic medicines, a new light has reappeared in my eyes”.

**Ann Marie Kjellander** is a woman , who has been operated several times throughout 10 years and got some ribs removed, she was reborn thanks to the laughing therapy, with benefits not only on her body but also her general mental health. Due to her miraculous experience she put up a group of over 60 laughter yoga, to strengthen these peoples bodies and minds.

**Laughter with women: from adolescence to menopause and over** , **Laura Bioghini** noticed that these women would find benefits with tensions. She helped adolescence with eating disorders because laughter can help with excessive control over ones body and food ingestion/egestion and in being conscious of the issue.. Moreover, it has proven that oxytocin (the hormone produced by the hypothalamus) helps people with eating disorders in fact laughing produces oxytocin. She also worked with pregnant women, as laughing transmits joy to the fetus and relaxes the cervix and the perineum, in preparation for the labour. For women laughter is also beneficial during pregnancy and labour, because the movements while laughing act upon the diaphragm and help develop contractions. After birth, laughter betters the quality of the maternal milk and the quality of the mother’s skin. Moreover, it really helps psychologically during the post-partum crisis and the loss in self-esteem linked with the crisis. In fact, Miss. Bioghini reports the experience of short laughing sessions in pediatric studios.

**Problems between Parents and Children: Lucio Sebastiani** started a project to tighten the relationship between a parent and a child through various techniques including the application of laughter.

#### Criticisms of Laughter Therapy

It is to be mentioned that not every scientific source is in favour of Laughter Therapy. A study conducted by Dr.Patch Adams lead to the conclusion that laughter is not purely beneficial.

He identified three classes of findings: benefits from laughter, harms from laughter, and conditions causing pathological laughter.

Out of 785 papers reviewed, benefits from laughter appeared in only 85 papers, while harms in 114 and conditions causing pathological laughter in 586.

Benefits of laughter include reduced anger, anxiety, depression and stress, reduced tension (psychological and cardiovascular), increased pain threshold, reduced risk of myocardial infarction, improved lung function, increased energy expenditure and reduced blood glucose concentration.

However, laughter could produce different harms, like syncope, cardiac and oesophageal rupture, protrusion of abdominal hernias, asthma attacks, emphysema, headaches, jaw dislocation, incontinence.

As a side effect it was also listed pathological causes of laughter, among them epilepsy, cerebral tumors, strokes, multiple sclerosis or motor neuron disease.

#### **Psychological harms**

Humour weakens resolve and promotes brand preference, so the prudent response to the drug rep's spiel would be "Don't make me laugh."

### **Cardiovascular harms**

Hearty laughter can cause syncope, perhaps by a neural reflex response to the increase in intrathoracic pressure that accompanies intense laughter. Syncope after laughing has accompanied bilateral carotid stenosis in Takayasu arteritis. Laughing can cause conduction anomalies and arrhythmias. A woman with long QT syndrome and a history of torsade de pointes took ziprasidone, collapsed, and died after intense sustained laughter. Laughter in Angelman's ("happy puppet") syndrome can cause asystolic arrest, apparently of vagal origin. Laughing fit to burst can cause cardiac rupture.

### **Respiratory harms**

The quick intake of breath that accompanies laughter can provoke inhalation of foreign bodies.

In patients with asthma, laughter sometimes triggers an attack, but cough after laughing is commoner than a good wheeze. Asthma was once perceived as a psychological disorder, but Gillespie noted that laughter probably had a physical rather than a psychological effect, and that even hollow (non-Duchenne) laughter could trigger an asthma attack.

Laughter can cause pneumothorax. Pilgaard-Dahl syndrome, named after two Danish revue actors, is pneumothorax in middle aged smokers induced by laughter. If the YouTube video we have watched is representative, non-Danish speakers are not at risk. Interlobular emphysema can reportedly result from "efforts of parturition and of defaecation, by the lifting of heavy weights, during coitus, by paroxysms of rage, excessive laughter, and hysterical convulsions."

Exhaled airflow—from sneezing, whistling, and laughing, for instance—potentially disseminates infection. Paper tissues may reduce spread. So, we suspect, might laughing up your sleeve.

### **Central nervous system harms**

Cataplexy, often allied to narcolepsy (Gélineau's syndrome), is characterised by sudden loss of muscle tone provoked by laughter and other stimuli. It is apparently difficult to elicit during medical consultation perhaps because "laughing by itself" is a much less powerful stimulus than "laughing excitedly." The combination of muscle weakness induced by laughter and the ability to hear during an episode distinguishes cataplexy from sleep apnoea. In one case, cataplexy induced by laughter affected only the right side of the body; this patient presumably could still laugh on the other side of her face.

Laughter, like many pleasurable things, including ice cream, chocolate, and sex (separately, and perhaps together), may precipitate headaches. The Chiari malformation and colloid cysts of the third ventricle are occasionally associated with laughter induced headache.

A woman with a patent foramen ovale laughed uproariously for three minutes, became aphasic, and had a cerebral infarct.

### **Gastrointestinal harms**

A good belly laugh can make a hernia protrude, aiding diagnosis in children—rapture unmasking rupture. By contrast, failure to laugh is an important sign of intra-abdominal infection in children. Laughter is an unusual precipitant of Boerhaave's syndrome, spontaneous oesophageal perforation.

### **Musculoskeletal harms**

Laughing can dislocate the jaw. Rectus sheath haematoma is described as an adverse reaction to side splitting "laughter therapy."

### **Urinary tract harms**

Laughing like a drain can cause stress incontinence. It can also cause “enuresis risoria” (“giggle micturition” or “giggle incontinence”), a consequence of uncontrolled detrusor contraction induced by laughing, for which methylphenidate has been advocated.

**Pathological causes of laughter**

Laughter has its serious side. We have identified many disorders associated with unprovoked laughter, for example, gelastic seizures (seizures manifest by laughing—true nervous laughter; web table).