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CAN LAUGHTER & HUMOR HELP YOU LIVE LONGER?

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Voltaire wrote, "The art of medicine consists of keeping the patient amused while nature heals the disease" but the health benefits of humor, happiness and laughter have been recognized since antiquity. The Bible tells us that **"A merry heart doeth good like a medicine**" and Jonathan Swift said, "The best doctors are Dr. Quiet, Dr. Diet and Dr. Merry-Man." Kings and nobles often retained jesters in their entourage to promote the health rewards of laughter. Lord Byron also recommended, **"Always laugh when you can. It is cheap medicine."**

What purpose laughter serves is not clear, but the 19th century English essayist William Hazlitt believed that, **"Man is the only animal that laughs and weeps**, for he is the only animal that is struck with the difference between what things are, and what they might have been." Some dogs, dolphins, monkeys and apes may seem to smile but this does not necessarily reflect humor or happiness and neither these nor any other animals ever laugh. This includes laughing hyenas, so named because they often make a howling or chuckling sound when excited.

As noted in prior Newsletters, some studies have found that happy people with cheerful dispositions live longer than those who are grouchy pessimists. "He who laughs, lasts!" and "You don't stop laughing because you grow old. You grow old because you stop laughing." are other quotations that support these observations. It has been proposed that laughter can promote a longer and healthier life by reducing stress and its damaging effects on the heart and by increasing immune system resistance to infections and malignancies.

ALSO INCLUDED IN THIS ISSUE

J. I. Rodale, who founded *Prevention* magazine and thoroughly researched the relationship between various emotions and different diseases believed and actually wrote a book entitled ***Happy People Rarely Get Cancer***. Laughter has been referred to as the only tranquilizer without side effects and the shock absorber that eases the blows and blunts the harmful effects of stress on health and life.

Norman Cousins And *Anatomy Of An Illness As Perceived By The Patient*

My good friend, the late Norman Cousins, was responsible for popularizing the belief that laughter had powerful stress reducing properties that could not only relieve pain but combat disease and promote health. His account of a personal experience, *Anatomy Of An Illness (As Perceived By The Patient)* was published in a 1976 issue of the prestigious *New England Journal of Medicine*, which rarely accepts submissions from lay individuals. It was so compelling that he received letters from thousands of doctors and stimulated a subsequent flurry of research to determine whether there was any scientific basis for his claims. It was also responsible for his desire to support and serve as a Founding Trustee of The American Institute of Stress and our close personal association. Unfortunately, his article was often distorted and misinterpreted by the media and some "holistic" practitioners and it is important to correct this by providing some pertinent information to put his contribution in proper perspective.

In 1963, while editor of *The Saturday Review of Literature*, Norman had been asked to go to Russia by Pope John Paul XIII and President John F. Kennedy to broker a deal with Nikita Khruschev for the release of Ukrainian Cardinal Josyf Cardinal Slipyj, who had been incarcerated since the end of World War II. This was during the height of the Cold War and shortly after the Cuban missile crisis, when Russia and the U.S. were assembling large amounts of nuclear warheads. Norman was a severe critic of the atomic bomb and nuclear warfare. He had been a "culture consultant" for General MacArthur during the U.S. occupation of Japan, who told him that his opinion had not been sought about the bombing of Hiroshima and Nagasaki. When asked what his advice would have been, MacArthur told him that he saw no military justification and that "the war might have ended weeks earlier if the U.S. agreed, as it later did anyway, to the retention of the institution of the Emperor." Since Norman's strong views on atomic warfare were well known, Kennedy wanted him to convince the Russians that we were anxious to have a worldwide moratorium on the production and stockpiling of nuclear weapons. The Cardinal was released after suffering eighteen years in various Siberian concentration camps and although he was expected to die shortly thereafter, lived another 21 years. Kennedy's proposal received a polite but cool response.

Kennedy was assassinated in November 1963; in July 1964 Norman was again sent to Russia to convey President Johnson's growing concerns about the possible need for U.S. intervention to halt the communist North Vietnam invasion of South Vietnam and also to dispel rumors that the Kremlin might somehow have been implicated in Kennedy's assassination. Cousins had also been outspokenly opposed to any direct U.S. involvement in Vietnam and although ostensibly the head of an American delegation to explore how to improve cultural exchange, he was actually more involved in private conferences with Khruschev and KGB officials to accomplish his other missions. Khruschev was adamant about not caving in to any other American requests. In addition, he was suspicious about Johnson's sincerity and Norman was stonewalled in his attempts to negotiate any sort of agreement or compromise. His hectic schedule included meetings in Moscow and Leningrad that lasted late into the night and ceremonial duties that were equally frustrating and unrewarding. In addition, his accommodations on the second floor of a hotel during the hot summer months required him to keep his windows wide open and he was constantly exposed to the diesel fumes of a procession of noisy trucks going back and forth to a nearby construction site. He got little sleep, usually woke up feeling nauseated and on his last day in Moscow, was subjected at point-blank range to the exhaust spewing out of a large jet as it swung around on the tarmac.

He developed a headache during the long and overcrowded flight back to New York and his legs and back began to feel uncomfortable. By the time he landed his temperature was 104° and after two days of bed rest he was admitted to New York Hospital because of progressively severe pain and difficulty in moving his neck, arms, hands, fingers and legs. His sedimentation rate, an index of inflammation, was markedly elevated, gravel like nodules under the skin began to appear on his neck and the back of his hands and his joints became

so stiffened and painful that he could not move his extremities and had difficulty turning over in bed. At one point, his jaws were almost locked. Numerous specialists saw him and the general conclusion was that he was suffering from a connective tissue disorder known as ankylosing spondylitis. This is a progressive form of chronic inflammation and arthritis involving the spine and sacroiliac joints that can ultimately result in a complete fusion (ankylosis) and immobility of the spine. It may also produce inflammation and injury in other joints and involve the eyes, heart, lungs and kidneys. What might have caused his condition was not clear but heavy metal poisoning and streptococcal infection had been implicated in some cases. **There was no cure and when he asked about his chances for a full recovery, a leading authority indicated that the odds were about one in 500 and that he had never personally witnessed this**. Norman thought hard about the events leading up to his illness. While inhaling the diesel and fuel fumes seemed a possibility, his wife Ellen, who accompanied him on the trip, had the same exposure and suffered no ill effects. He had been very impressed with Hans Selye's theories about the role of stress in arthritis and other diseases and **the severe stress of his recent Russian ordeal seemed a much more likely cause.** At the age of 49, this highly intelligent and personable individual, who was also an accomplished pianist, equestrian, golfer and tennis player, could look forward to only possibly being able to walk with braces and crutches, but would more likely spend most of the remainder of his life in a wheel chair or bed, with pain as his constant companion.

Norman concluded that the hospital might not be the best place for him. The repeated drawing of blood several times a day by three or four different departments together with the deplorable food was now causing him additional stress. He decided to take charge of his own care, and with the approval of his physician, a close friend for over twenty years, checked into a nearby hotel, where he could select a more nutritious and appealing diet. Requests for blood samples were coordinated so that only one was obtained daily for all interested parties to share. In addition to costing two thirds less, his hotel room was a serene sanctuary where he was not constantly interrupted or awakened for bed baths, change of bed sheets, medications, meals or repeated examinations by interns and other house staff. He read everything he could that might be relevant to his disorder, including Selye's *The Stress of Life* and *From Dream to Discovery*, as well as examples of apparently spontaneous remission in other deadly disorders. Since laughter seemed to represent the opposite of stress he reasoned that it might be a potent ally and spent much of the day watching Marx brothers' movies, reruns of Candid Camera and other humorous movies and shows. He soon found that **10 minutes of belly laughing could relieve his pain for up to two hours and allow him to get much needed and restorative sleep.** He was also impressed with the research of Linus Pauling, another Founding Trustee of The American Institute of Stress, who had allegedly achieved remarkable results in diseases ranging from the common cold to cancer using unusually large doses of vitamin C (ascorbic acid). Inasmuch as one of the earliest measurements of stress in Selye's animal studies had been the degree of depletion of ascorbic in the adrenal cortex, Cousins reasoned that massive vitamin C supplementation might replenish his exhausted adrenals and speed up his recovery.

The problem was that neither he nor anyone else he contacted was able to tell him how much vitamin C to take. Taking large doses by mouth could cause gastrointestinal complaints and had been reported to result in kidney damage. He learned that up to 3 grams of vitamin C had been administered by intramuscular injection but suspected that sudden large amounts might not be fully utilized. One of the characteristics of vitamin C was that the body only absorbed as much as it needed at that moment and the remainder was excreted in the urine. It seemed preferable to provide it in a slow intravenous drip over three or four hours daily. He decided to start with 10 grams daily and work his way up to 25 grams unless there were side effects or tests showed that most of it was being excreted in the urine. This was entirely uncharted territory. His physician warned that what he proposed might seriously damage his kidneys as well as his arm veins but acquiesced with the provision that the procedure be

carefully monitored. A sedimentation rate was obtained before the first intravenous drip of 10 grams of vitamin C and when repeated after the drip had been completed showed a drop of nine points. The next day he received 12.5 grams, on the third day he received 15 grams, then a steady increase in dosage until 25 grams had been reached at the end of the week. There were no side effects and by the eighth day he could now move his thumbs without pain, had much less difficulty sleeping, the nodules were receding and his sedimentation rate had steadily declined. He was elated and subsequently discovered a clear correlation between greater requirements for vitamin C with the severity of his symptoms and sedimentation rate. When these were increased he could take very large amounts of vitamin C without significant amounts being detectable in his urine. However, when he had relatively few symptoms even half of the same dosage quickly showed up in significant amounts in urine specimens. He continued to make steady progress and his physician and consultants were amazed at his improvement not only with respect to relief of symptoms but objective measures of his mobility and various blood studies. He was able to ambulate with the aid of metal braces and after a few months was well enough to return to work full time despite some residual pain in his knees and one shoulder. Two or three years later he seemed to have completely recovered and I can personally attest to the fact that his golf game and tennis prowess were as good as ever.

Norman's remarkable recovery received widespread media coverage and commentary by various groups and individuals with vested interests whose interpretations caused considerable concerns. Some advocated massive doses of vitamin C for any disease, especially if it seemed related to stress. Others insinuated that it might be possible to "laugh" an illness away and such suggestions spurred sharp criticism from the medical establishment. In his 1975 best seller, *Powers of the Mind*, Adam Smith wrote that he had asked knowledgeable physicians what was responsible for Cousins' remarkable recuperation. The general conclusion was that it probably had nothing to do with his laughter or vitamin C therapy and that he probably would have recovered anyway. Other doctors who had read these comments explained that his extraordinary experience might have been a placebo effect and Norman agreed. As he had noted in his article, **"I was absolutely convinced, at the time I was deep in my illness, that intravenous doses of ascorbic acid could be beneficial — and they were. It is quite possible that this treatment — like everything else I did — was a demonstration of the placebo effect."** He was thoroughly familiar with the phenomenal power of placebos from articles by Stewart Wolf and others. In addition, his own personal experience with the medical missionary and Nobel Laureate, Dr. Albert Schweitzer, and the celebrated cellist Pablo Casals had convinced him of the power of a strong faith and will to live to remarkably relieve pain and disability and improve performance. There were numerous other examples that he cited in his 1979 book *Anatomy of an Illness As Perceived by the Patient: Reflections on Healing and Regeneration*. Its main message was summarized in the Introduction by René Dubos, which began with "**The basic theme of this book is that every person must accept a certain measure of responsibility for his or her own recovery from illness or disability**". It concluded with the warning "The questions raised by Cousins should not be read as casting doubts on the validity of scientific medicine." and that "Modern medicine will become really scientific only when physicians and their patients have learned to manage the forces of the body and the mind that operate *in vis medicatrix naturae.*" (the healing powers of Nature)

Norman expanded on this in his book by affirming that such a "life force may be the least understood force on earth" and that "human beings are not locked into fixed limitations." He also emphasized the importance of the physician-patient partnership in helping sick people to gain a sense of control over their illness. While stress was difficult to define since it differed for each of us, it was clear from all animal and clinical studies that the feeling of having little or no control was always distressful. Gaining more control was really the book's main message and there were several ways to attain this. Hans Selye had written, "Adopting the

right attitude can convert a negative stress into a positive one." Norman's hypothesis was that **if negative emotions and distress caused disease, as Selye had demonstrated in numerous animal studies, could positive emotions prevent this or promote health?** "Is it possible that love, hope, faith, laughter, confidence, and the will to live have positive therapeutic value?"

One of the most memorable and rewarding experiences I can recall was introducing Norman to Hans Selye at a meeting in my office and listening to their dynamic and deft discussion of the power of positive thinking, persistent hope and a firm faith.

Paul Rosch and Hans Selye at AIS inauguration

Norman Cousins and Paul Rosch discuss a Stress Congress

The Explosion Of Laughter Therapy Programs And "Humor Consultants"

Norman's book was on *The New York Times* best seller list for forty weeks and its popularity resurfaced when it was made into a 1984 movie that was nominated for an Academy Award. Unfortunately, as he and Dubos had feared, it was interpreted by many as suggesting that laughter might be some sort of panacea or that other unproven therapies with only anecdotal evidence of efficacy could reduce or replace the need for medications. After all, there was little doubt that regular jogging could provide numerous mental and physical rewards, such as reducing depression and stress and improving cardiovascular function. **According to Cousins, laughter was jogging inside instead of outdoors.** "Laughter is a form of internal jogging. It moves your internal organs around. It enhances respiration. It is an igniter of great expectations."

John F. Kennedy once said, "There are three things which are real: God, human folly and laughter. The first two are beyond our comprehension. So we must do what we can with the third." A whole new industry of laughter and humor specialists began to spring up. The Humor Project was founded in 1977 as the first organization in the world to "focus full time on the positive power of humor" and its membership and services have steadily grown since then. Their annual conference, "The Positive Power of Humor, Hope & Healing", in Saratoga Springs has attracted over 18,000 people from six continents; more than 2 million have attended their workshops and programs in at least a dozen countries and their corporate clients with in-house programs include Xerox, IBM, Kodak, Dupont and Red Cross in addition to The American Cancer Society, Mayo Clinic and other medical organizations. They now have more than 160,000 people on their American Humor Association mailing list who have attended their meetings and/or purchased various humor videos, tapes and publications. They have also awarded over 350 grants to non-profit organizations, human service agencies, hospitals, and schools in North America to promote humor programs and research.

Humor and laugh therapy quickly became a thriving and profitable business. In a 1988 Newsletter commenting on this, I noted that the charge for a half-day session to help stressed-out employees would cost a corporation about $5,000 and that one "humor consultant" had workshop bookings for the year with billings of over $300,000. Among these "humor consultants" were the physician sons of comedy stars Steve Allen and Sid Caesar, who along with their jokes, taught various "feel happy" techniques. Dr. Steve Allen Jr. had several prominent corporate clients and said in an interview, "this is an effort by American management to apply the Japanese management style to our culture. The Japanese believe that when people feel good about their colleagues and their work, they do better in their jobs." His approach was to get the audience to act silly using techniques like juggling brightly colored scarves to the beat of disco music and group games and activities to teach them "how to play the way they did when they were three-year-olds." **(Researchers report that children of nursery school age laugh between 300 to 400 times a day; adults only laugh an average of 10 to 15 times daily.)**

Since then, numerous organizations, publications, and web sites devoted to humor and laughter therapy have appeared, including the International Society for Humor Studies; World Laugh Center; American Humor Studies Association; The Association for Applied and Therapeutic Humor; The Laughter Remedy for Stressed out People and Organizations; *HUMOR*, The International Journal of Humor Research; The Australian Journal of Comedy; and Journal of Nursing Jocularity. There are web sites that focus on humor in Jewish, Irish, Native American and other ethnic groups, including ancient Egypt. Perhaps the most famous practitioner of humor therapy and sought after speaker is Hunter "Patch" Adams, a physician, clown and social activist who wanted to change the way medicine was practiced. He graduated from the Medical College of Virginia in 1971 and the following year, with the help of some friends, founded The Gesundheit! Institute. Its purpose was to correct what he viewed as a health care crisis due to spiraling costs, dispassionate and dispirited doctors and alienated patients by "replacing greed and competition with generosity, compassion and interdependence." Gesundheit! (Good Health) began as a free clinic designed to integrate the lives of those giving and receiving care by treating the patient as a person rather than focusing on a disease and fun and friendship were vital components of the therapy. Overnight stays were introduced to encourage this and over the next 12 years, the clinic had grown so much that the need for a larger facility or hospital was apparent. In 1980, the group purchased a 317 acre site in West Virginia to build a rural hospital that would further integrate medical care with "farming, arts and crafts, performing arts, education, nature, recreation, friendship and fun."

Adams raised funds through workshops, lectures and hospital visits that attracted donations due to extensive media coverage and in 1993, also wrote a book explaining what he hoped to accomplish entitled *Gesundheit!: Bringing Good Health to You, the Medical System, and Society through Physician Service, Complementary Therapies, Humor, and Joy*. This was so well received here and abroad that it led to the 1998 movie *Patch Adams* that depicted the story of his life. It shows how he was inspired to become a doctor while institutionalized as a teenager for depression, was criticized in his official medical school record for "excessive happiness" and was once told by his faculty advisor, "If you want to be a clown, join the circus." The movie was rated #1 at the box office for the first two weeks after it came out and earned a Best Actor Golden Globe nomination for Robin Williams for his portrayal of Patch as a compassionate clown whose outlandish costumes, contrivances and conduct brought laughter and cheer to hospitalized children and buoyed their spirits. This was quickly followed by two more Patch Adams books*, House Calls: How We Can All Heal the World One Visit at a Time* and *Illness and the Art of Creative Self-Expression: Stories and Exercises from the Arts for Those With Chronic Illness.* Others had also jumped on the laughter bandwagon with books like *Humor and Healing, The Healing Power of Humor, Laughter Therapy, Jest for Your Health, Philosophical Thoughts on Joking Matters* and a dozen others that often went into

second or paperback editions and were also available as audiotapes. These new publications engendered renewed interest in Freud's *Jokes and Their Relation to the Unconscious* as well as the 1990 paperback edition of *Head First: The Biology of Hope and the Healing Power of the Human Spirit* by Norman Cousins.

All sorts of claims were made for the rewards that laughter could provide, including:

Physical Health Benefits	**Mental Health Benefits**	**Work-Related Benefits**
		
Stronger immune system Improved cardiovascular health Reduced stress hormones Reduced pain Muscle relaxation	Less stress Reduced anger and anxiety Increased joy and vitality More positive and optimistic mood Greater sense of control Increased emotional stability and intelligence Improved resourcefulness and performance	Team building Communication skills Conflict management Morale and job satisfaction Creativity and problem solving Resilience Stress management Productivity

Various efforts to promote humor for patients in hospitals began to spring up, such as the Duke Humor Project. It was started in 1986 by a volunteer at Duke Medical Center and an epidemiologist who constructed a "Laugh Mobile". It was a cart packed with funny games and humor props such as rubber chickens, soap bubble pipes and water guns that was wheeled into patients' rooms where specially trained clowns interviewed them about their humor preferences. Originally designed for cancer and pediatric patients at Duke, it has now spread to over a dozen other area hospitals and is available for anyone. As a result of this and similar efforts, The American Institute of Stress received numerous requests from hospitals, nursing homes and other medical facilities for information on how to set up a humor room, or humor carts for their patients. Many corporations also wanted to know how they could incorporate humor into the workplace. Cousins was besieged by similar inquiries, many of which were also referred to us, especially those asking whether any of this had solid scientific support and what benefits might be expected. Fortunately, this also coincided with a flurry of research studies, some of which provided supportive and reassuring results.

Do The Health Benefits Of Humor And Laughter Have Scientific Support?

Part of the problem in obtaining proof that laughter promotes health or prolongs life is that it is sometimes viewed as being synonymous with humor and happiness. Laughter is not the same as humor or happiness. Laughter is the physical and physiological response to humor that frequently results in a feeling of happiness. The only link between all of these is that happy people and those with a good sense of humor are more apt to laugh at something that is funny than their crabby counterparts. A prior Newsletter entitled "Why Do Happy People and Optimists Live Longer" reviewed the evidence that validates this view and discussed

possible explanations for such relationships. Since then, this belief has been bolstered by other reports that also shed light on some mechanisms of action that may be responsible. In one study of 2500 senior citizens that were followed for six years, those who scored high on a happiness quiz had much fewer strokes than those at the bottom of the scale.

In another study of more than 200 middle-aged healthy London civil service employees, those who reported feeling happy almost every day, whether while at work or on weekends, were significantly healthier and had lower heart rates than others who were not as consistently jolly and gleeful. Researchers asked participants to rate their happiness at 33 times during work or leisure days during which they also monitored heart rate and blood pressure. Saliva samples were collected eight times a day to determine concentrations of cortisol, a stress–related hormone that increases risk for heart disease and diabetes. In addition, all were subjected to a mental stress test, following which they were asked to rate their happiness level on a scale of 1 to 5 and blood samples were obtained to measure fibrinogen, a blood clotting factor and index of inflammation associated with increased risk of coronary heart disease. After adjusting for age, smoking, weight and other possible influences, it was found that people in the top fifth for daily happiness scores had cortisol levels 32% lower than those in the bottom quintile. Happiness was also linked to a lower average heart rate in men. While the majority showed some rise in fibrinogen following the mental stress test, this was far greater for the least happy group compared to those at the other end of the scale. Surprisingly, there was no evidence of any relationship between happiness levels and age, sex, marital status or socioeconomic status. The happiest people reported feeling that way whether working or during leisure time but those who were least happy tended to report this more while they were working.

These subjects were part of the large ongoing Whitehall II study designed to determine the causes and health effects of job stress in British civil service workers. The original Whitehall study that started in 1967 showed that males in the lowest clerical jobs had the highest overall mortality rate and heart disease death rate whereas top administrators had the least; there was a consistent inverse correlation between mortality and grade of employment for those in between. The second, Whitehall II, began in 1985, and was designed to confirm and explore the reasons for this disparity. In one phase, investigators interviewed over 2000 male civil servants aged 45-68 who had completed questionnaires detailing their medical history, job title and responsibilities, mental health, diet, smoking, alcohol use and physical exercise habits. Various risk factors for coronary disease were measured including heart rate variability (HRV), which reflects the heart's ability to adapt to changing situations such as increased physical activity and emotional distress. As emphasized in previous Newsletters, low HRV, a strong predictor of sudden death and coronary events, may be the most accurate way to assess the severity of job stress. Researchers very recently reported that a diminished HRV was more common in workers at the bottom of the corporate ladder. However, it was also associated with job stress due to a sense of little job control that was independent of civil service employment grade. One might assume that frustrated workers with little job control would be less happy than others. HeartMath studies have also confirmed that feelings of frustration lower HRV while those of happiness and satisfaction have the opposite effect. In addition, a prior Whitehall II report on male workers showing a link between low HRV and high job stress levels may help explain why both, as well as depression, can contribute to coronary disease. Low HRV was associated with an increase in cortisol, fibrinogen and other chemicals believed to cause insulin resistance, diabetes, hypertension and other manifestations of metabolic syndrome, a major risk factor for cardiovascular disease. This suggests that **it is not that healthy people are happy but rather that they promote their health by being happy and thus have a higher HRV.**

While happiness may be associated with better health or longevity, is there any proof that laughter per se provides similar benefits? Japanese researchers suggested it might help

patients with type 2 diabetes, the most common form of this disease. They showed that there was a significantly smaller spike in blood sugar after a meal when diabetics watched a popular comedy show compared to listening to a boring lecture. In another study of patients allergic to dust mites and other common irritants, skin lesions shrank after watching Charlie Chaplin's antics in *Modern Times,* whereas a video containing weather information had no effect. There is abundant evidence that laughter can relieve pain, as Norman Cousins had claimed. A five-year study that began in 2000 called R_x Laughter at UCLA's Jonsson Cancer Centre was designed to determine if laughter could lessen pain and improve immune system function in children suffering from cancer and other chronic diseases. It started with the help of a $75,000 grant from cable TV network Comedy Central by working with hundreds of children to determine what makes them laugh. One of the methods used was to ask them to hold their arms in cold water as long as they could for up to three minutes. It was found that kids watching funny videos during the experiment reported significantly less pain and could also keep their arms in the cold water longer than controls not viewing the videos.

Other benefits of laughing reported by this and other groups here and abroad include:

- Relaxation and reduction in muscle tension
- Lowered production of stress hormones
- Improved immune system function
- Reduction in blood pressure
- Clearing the lungs by dislodging mucous plugs
- Increasing the production of salivary immunoglobulin A, which defends against infectious organisms that enter through the respiratory tract.
- Aerobic effects that increased the body's ability to utilize oxygen (Cousins called laughing "internal jogging" and **it has been estimated that laughing 100 times is equal to 10 minutes on a rowing machine or 15 minutes on an exercise bike**.)
- A rapid ability to disregard aches and pains or to perceive them as less severe (Children watching funny videos while undergoing painful procedures required less pain medication during as well as after the procedure. Patients who were told hilarious one-liners following surgery also had reduced requirements for pain drugs compared to controls.)

Groucho Marx once said that **"a clown is like an aspirin, only he works twice as fast."** and there are no adverse side effects of laughter save for an attack of wheezing in some susceptible asthmatics. More information about the above and a list of relevant articles and books can be obtained by contacting RxLproject@aol.com

Support for these various assertions comes from researchers like Lee Berk, associate director of the Center of Neuroimmunology at Loma Linda University School of Medicine, who has been investigating the health effects of humor for over two decades. He and his colleagues have published studies showing that laughing lowers blood pressure, reduces stress hormones, improves muscle relaxation, and boosts immune function by raising levels of gamma interferon, natural killer and T-cells to resist infection as well as B-cells that produce disease-destroying antibodies. In addition, laughter triggers the release of endorphins, the body's natural painkillers that can also produce a general sense of well-being or even euphoria. In one study, they found that simply anticipating a funny event could produce some of these responses by telling half of a group of healthy male students that they would be viewing a hilarious video in three days as part of their class assignment. Blood tests showed a prompt drop in stress hormones and a rise in protective immune system components and chemicals that promote relaxation. These differences became more pronounced as it got closer to show time but no change was seen in the group that was unaware of the forthcoming video. In another study, heart attack patients in the same cardiac rehabilitation program were divided into two groups with similar

cardiovascular status and medication requirements. One group also watched a funny 30 minute sitcom daily. All patients were examined periodically and at the end of a year, it was found that the humor group had lower blood pressures and drug dosages and had suffered fewer episodes of disturbances in heart rhythm and recurrent heart attacks. Michael Miller, director of preventive cardiology and co-workers at the University of Maryland Medical Center gave 150 patients with coronary disease and 150 healthy people a questionnaire designed to determine their sense of humor and how they would react to absurd social situations that could be perceived as either laughable or irritating. Levels of hostility and anger were also measured. They found that **the heart disease group was 40% less likely to see the humor in daily life when compared to healthy controls the same age.**

One might argue that this might simply mean that people with heart disease may be more depressed or anxious about their health and therefore less likely to view situations or jokes as humorous. In an attempt to explore this, Miller's group studied 20 non-smoking, healthy men and women (average age 33), all of who had normal blood pressure, cholesterol and blood glucose levels. They were randomized to watch a segment of a movie that would cause marked mental stress or one that made most people laugh. Prior to seeing these movies the volunteers fasted overnight and were given baseline tests to measure blood vessel reactivity by using a blood pressure cuff to restrict blood flow in the brachial artery in the arm for five minutes and then releasing it to see how the artery responded to the sudden increase in flow by using an ultrasound device. Participants watched a 15-minute segment of each movie while lying down in a temperature-controlled room. Numerous blood vessel reactivity measurements were performed before and for an hour after both the laughter and mental stress phases of the study in each subject. At the March 2005 meeting of the American College of Cardiology, Miller reported that **there were no differences in baseline measurements of blood vessel dilation before either movie but striking contrasts were seen afterwards**. Brachial artery flow was reduced in 14 of the 20 volunteers following the mental stress movie clip whereas it increased in 19 of the 20 volunteers after watching the segment that generated laughter. These changes persisted for 30 to 45 minutes. Blood vessel tone is regulated by activities of the inner endothelial lining of the artery wall, which also influences coagulation and secretes substances in response to injury or irritation that can contribute to coronary disease. As Miller noted, "The endothelium is the first line in the development of atherosclerosis or hardening of the arteries, so, given the results of our study, it is conceivable that laughing may be important to maintain a healthy endothelium, and reduce the risk of cardiovascular disease. **At the very least, laughter offsets the impact of mental stress, which is harmful to the endothelium. The magnitude of change we saw in the endothelium is similar to the benefit we might see with aerobic activity, but without the aches, pains and muscle tension associated with exercise."**

Overall average blood flow decreased 35 percent during mental stress, confirming previous studies demonstrating vasoconstriction due to stress. However, this is the first time that laughter has been shown to have the opposite and beneficial response, which was seen in 95 percent of the subjects. Miller indicated that it is still not clear how laughter relaxes blood vessels to produce vasodilatation, "Does it come from the movement of the diaphragm muscles as you chuckle or guffaw, or does it come from a chemical release triggered by laughter, such as endorphins? " Another possibility is that laughing causes release of nitric acid, which is a powerful dilator. According to the Encyclopedia Britannica, laughter consists of "rhythmic, vocalized, expiratory and involuntary actions". Fifteen facial muscles contract including the zygomatic major that lifts the upper lip. At the same time, the epiglottis partially closes the larynx leading to irregular air intake that causes you to gasp. In extreme circumstances, there is stimulation of the tear ducts and while the

mouth is opening and closing and the struggle for oxygen intake continues, your face can become moist and red or even purple. The noises accompanying this bizarre behavior can range from gentle giggles to gigantic guffaws. Charles Darwin wrote, "It is scarcely possible to point out any difference between the tear-stained face of a person after a paroxysm of excessive laughter and after a bitter crying-fit". However, the chemical composition of tears of laughter differs from tears of crying because of grief or irritation from peeling onions, although the significance of this is not clear.

What Makes Us Laugh? Why Don't You Laugh When You Tickle Yourself?

We laugh at jokes or something we see when we expect one outcome and are suddenly surprised by another. In movie thrillers as tension and suspense start to peak, directors often break it up by inserting something unanticipated or comical that helps viewers to get rid of pent-up feelings. This is frequently followed by another buildup of anxiety and stress and the process is repeated. Comic relief allows us to cope with such conflicting or incompatible emotions and thoughts by providing a mental break and a feeling of comfort. In embarrassing or threatening situations laughter may serve as a conciliatory gesture or as a way to deflect anger, especially if the threatening person joins in. **Some believe that laughter may have originated as a signal of shared relief at the passing of danger and since it results in a sense of relaxation that inhibits fight-or-flight responses, may also signify trust in others.** One cultural anthropologist proposes that the purpose of laughter is to develop and strengthen connections between people since, "Laughter occurs when people are comfortable with one another, when they feel open and free. And the more laughter the more bonding within the group." This "bonding-laughter-more bonding" feedback loop combined with a common desire not to be different from others **may help to explain why we are 30 times more likely to laugh when people are present (including watching TV) and why laughter is often contagious**. One study showed that **even laughing gas (nitrous oxide), an anesthetic used to prevent pain, loses its punch when taken in solitude.** Nitrous oxide dampens the nervous system, which reduces inhibitions and can produce a sense of euphoria that makes some people feel and act so silly and giddy that they often laugh.

Some people tend to laugh at jokes or situations that focus on somebody else's stupidity, mistakes or misfortunes because it makes them feel superior. Studies show that dominant individuals like bosses and tribal chiefs use humor more than subordinates. This helps then exercise power by controlling the emotional climate of the group, which is why workers are much more likely to laugh at a superior's joke even if they don't find it funny. People don't laugh at the same things depending on their sociocultural background and age. Toddlers, children, teens and adults show significant differences about what they feel is funny. When someone says, "That's not funny" they either mean that they didn't get the point or that they find it offensive. Sexist and racist jokes can be repugnant to many who feel strongly about abolishing bigotry and prejudice. **As noted, we are most likely to laugh at jokes and situations when we are suddenly surprised by a punch line or something that is totally unexpected. This may explain why someone can tickle you into hysterical laughter but, as Aristotle noted, you get no such response by tickling yourself in the same fashion in the identical spot**. Although most young children instinctively giggle when they are tickled, prolonged tickling has been called one of the worst medieval tortures ever devised. A tickle has been assumed to cause laughter because it is a reflex response and whether you or someone else initiates this stimulus, the information sent through your spinal cord to the brain should be the same. However, for tickling to make you laugh the brain apparently requires an element of surprise, just like a joke. Why this is so important remains a mystery and various types of tickling machines have been constructed to explore this. One researcher reported that when people believe a machine is tickling them they laugh just as hard, suggesting that personal contact is not essential.

What happens during laughter involves a series of complex actions in the cerebral cortex that may explain why laughter and perhaps even humor is unique to humans. As shown to the right, a portion of the frontal lobe involved in thinking is responsible for recognizing that something is very funny. Part of the motor cortex moves the muscles that make you smile and laugh, and the resultant overall feeling of happiness originates in the nucleus accumbens, an area in the brain's limbic system that is associated with providing a sense of reward or pleasure.

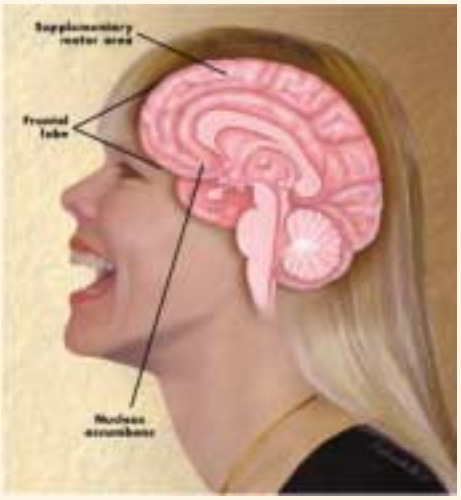

Illustration by Lydia Kubiak

Gelotologists, researchers who study the physiology of laughter, have also found that other interconnected structures in the brain such as the amygdala, hippocampus, and hypothalamus may also be involved. The medial portion of the hypothalamus has been identified as a major contributor to the production of loud, uncontrollable laughter. Happy people tend to have more activity in the brain's left prefrontal cortex in response to stress while anxious, pessimistic persons typically respond with activity in their right prefrontal lobes that tends to persist longer and delays recovery from negative events. One study found that an area of the frontal lobe was activated only when people thought a joke was funny. Another reported that people with damage to their frontal lobes were more likely to choose a wrong punch line to written jokes and didn't laugh or smile as much at humorous cartoons.

The bottom line is that Norman Cousins' hypothesis about the healing power of laughter and optimism has received strong support from scientific studies and is now generally accepted by the medical community. In 1978, at the age of 62 and despite the lack of a medical degree or any formal training, he was invited to join the UCLA School of Medicine as Professor of Medical Humanities. He continued his studies on the effect of humor and emotions on health and immune system function until his death in 1990. He also established the Cousins Center for Psychoneuroimmunology that has attracted leading immunologists, neuroscientists and researchers in behavioral medicine and other relevant disciplines. Many have often wondered about the role of vitamin C in his remarkable recovery since Linus Pauling's results in diseases ranging from colds to cancer have been disputed and most doctors believe that any purported benefits were placebo effects. Here again, Norman appears to have been vindicated. National Institute of Health researchers had previously confirmed that people quickly excrete vitamin C when it is given orally, so that increased blood concentrations promptly fall and remain low. However, when the identical dosage was given by intravenous drip, blood levels were up to 70 times higher and lasted much longer. In their latest study they applied vitamin C in concentrations that mimic an intravenous drip to healthy human and mouse cells and various types of cancer cells. They found that **after incubation with vitamin C for only one hour, 50% of malignant cells were killed in 5 of the 10 cancer cell cultures. No effect was seen on healthy cells.** Further tests found that a chemical in the wall of cancer cells converted vitamin C to hydrogen peroxide, a powerful free radical that kills cells. These results were published in the Sept. 20 issue of the prestigious *Proceedings of the National Academy of Sciences,* along with the hope that they would prompt researchers to reconsider the unusual and unanticipated rewards of an intravenous vitamin C drip as a treatment for cancer, infections and other diseases where hydrogen peroxide is likely to be effective.

George M. Cohan advised, "Always leave them laughing when you say goodbye", and so to conclude this Newsletter I have appended a few Henny Youngman jokes:

"Doctor, my leg hurts. What can I do?"
The doctor says "Limp!"

"Doctor, I have a ringing in my ears."
"Don't answer"

A man goes to a psychiatrist and says "Nobody listens to me!"
The doctor says "Next!"

A doctor gave a man six months to live. The man couldn't pay his bill, so he gave him another six months.

A man goes to a psychiatrist.
The doctor says "you're crazy!"
The man says "I want a second opinion!"
"Okay, you're ugly too!"

The doctor says "You'll live to be 60!"
"I AM 60!"
"See, what did I tell you?"

The doctor called Mrs. Cohen saying "Mrs. Cohen, your check came back."
Mrs. Cohen answered "So did my arthritis!"

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