PRBIS BRAINSCAN

VOLUME 1 ISSUE 7 JANUARY 2012

POWELL RIVER BRAIN INJURY SOCIETY

In your hands-or on your computer screen, you have the final(!!) issue of the PRBIS BRAINSCAN. Over the course of the year I have quite enjoyed working with everybody apart of the Powell River Brain Injury Society as editor-in-chief of the BRAINSCAN. Thanks for the opportunity Debbie. Thanks to all those who submitted articles for the newsletter over the year and to those who did not, I'll get you next time. Everyone have a wonderful new year. Peace be unto you all.

-Message from Josh

First of all I want to thank Debbie and everyone else for giving me this awesome opportunity to work here. It's hard to believe that it already has been a whole year since Josh and I have started. I had a lot of fun learning how a library works and cataloging the books into the system and organizing them.

I will take all the things that I have learned and put them towards my future goals.

-Message from Melissa

MATCH THESE TERMS WIITH THEIR DEFINITION ON THE NEXT PAGE

Cingulate gyrus

Parahippocampal gyrus

Pons

Fornix

Hippocampus

Medulla oblongata

Basal Ganglia

Limbic system

Amygdala

Corpus Callosum

TURN TO PAGE 5 FOR THE ANSWERS

Limbic structure involved in many brain functions, including emotion, learning and memory. It is part of a system that processes "reflexive" emotions like fear and anxiety.

plays a role in processing conscious emotional experience.

an arch-like structure that connects the hippocampus to other parts of the limbic system.

plays a significant role in the formation of long-term memories.

contains centers for the control of vital processes such as heart rate, respiration, blood pressure, and swallowing.

a group of interconnected structures that mediate emotions, learning and memory.

an important connecting pathway of the limbic system.

contains centers for the control of vital processes, including respiration and cardiovascular functions. It also is involved in the coordination of eye movements and balance.

Connects right and left hemisphere to allow for communication between the hemispheres. Forms roof of the lateral and third ventricles.

Subcortical gray matter nuclei. Processing link between thalamus and motor cortex. Initiation and direction of voluntary movement. Balance (inhibitory), Postural reflexes.

Made-in-Canada Technology: Virtual brain surgery centre launched in Toronto. Government of Canada investment revolutionizes medical training, reduces risks from brain surgery

A new virtual reality brain surgery training centre that will benefit Canadians undergoing brain surgery opened at the Toronto Western Hospital. Bob Dechert, Member of Parliament for Mississauga–Erindale, along with Senator Don Meredith, made the announcement on behalf of the Honourable Gary Goodyear, Minister of State (Science and Technology).

“Our government is investing in science and technology to improve the quality of life of Canadians, strengthen the economy and create jobs,” said MP Dechert. “This investment will save lives by reinforcing Toronto’s reputation as a world leader in medical research and providing opportunities to market made-in-Canada technology to the world.”

In September 2010, Minister Goodyear was at the Montreal Neurological Institute and Hospital of McGill University to open the first new virtual reality neurosurgery training centre in Canada. The Montreal and Toronto facilities are two of seven new virtual training centres to be established across the country in London, Winnipeg and Calgary. Centres already exist in Halifax and Ottawa.

“This investment by the Harper Government will improve the quality of life and health of families across the Greater Toronto Area,” said Senator Meredith.

Developed by the National Research Council of Canada, this state of the art technology is being installed at the Toronto Western Hospital’s Krembil Neuroscience Centre in collaboration with the International Centre for Telesimulation and Innovation in Medical Education, at the University Health Network in Toronto. The new facility will provide neurosurgeons with a new, highly specialized tool—a virtual reality neurosurgery simulator—to enhance training and to practice patient-specific brain surgery. This will help reduce the risk of complications during surgery, speed up recovery, and streamline time in the operating room.

“This new virtual neurosurgery training centre is a very welcome addition to the Krembil Neuroscience Centre,” said Dr. Robert Bell, president and Chief Executive Officer at University Health Network. “It is a significant leap forward in surgical training and in patient care, allowing physicians to train on simulated brain tumours and to rehearse more complex surgeries specifically tailored to each patient.”

While Canada continues to lead the world in next generation virtual reality medical simulation, this new technology is laying the groundwork for sharing know-how and advanced made-in-Canada solutions with the world.

ANSWERS TO MATCH UP GAME ON PAGE 2 AND 3

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Your Child's Brain… on a Roller Coaster

by Katy Abel

Faster Than A Speeding Bullet...

Well, maybe not quite. Yet without a doubt, the new high-speed roller coasters making their debut at theme parks across the country this season are incredibly fast. But is a wild ride just a great dose of summer fun... or cause for concern?

Do Fast Rides Cause Brain Damage?

"This may seem foolhardy, but no," says Anna L., who with her 14-year-old daughter Haley has enjoyed several of the new thrill rides, including the "Mantu" at Busch Gardens. "I get the feeling that with liability insurance as high as it is, most of these amusement parks are very careful."

That's what the industry claims, but with no federal regulations governing the parks, we'll have to take their word for it. In the wake of six deaths at amusement parks last summer -- including four accidents at three parks in a single week last August -- some suggest there should be more oversight.

Congressman Edward Markey (D-MA) has sponsored a bill that would allow the Consumer Product Safety Commission to conduct safety inspections following an accident. A hearing on the bill, H3032, was held in mid-May.

Some parents and policymakers are also concerned about new research showing a potential link between high-speed roller-coaster rides and brain injuries. In a 2000 issue of the medical journal, Neurology, Japanese researchers reported the case of a 24-year-old woman who developed subdural hematomas (blood clots) on both sides of her brain following six rides on three high-speed roller coasters (including the Fujiyama, believed to be the fastest, steepest roller coaster in the world.) Since the report in Neurology, other disturbing findings of brain injuries linked to roller coaster rides have surfaced.

Are Riders at Risk? Stats to Consider, Tips to Remember

At least 18 brain injuries due to roller-coaster rides have been documented by Dr. Pete Speth, forensic pathologist in Wenonah, New Jersey. "It's Newton's law of physics," Speth told The Des Moines Register. "If the head suddenly stops, the brain will keep moving."

Responds John Graff, president and CEO of the International Association of Amusement Parks and Attractions: "I'm not a medical person, but he's right that a body in motion continues in motion. Still, the modern technologies make it possible to calculate all of those forces."

In 1998, there were 4500 injuries blamed on rides at standing amusement parks in the U.S. Only 36 resulted in hospitalization (source: Consumer Product Safety Commission).

The number of injuries requiring emergency-room treatment increased 24 percent from 1974 to 1998 (source: Consumer Product Safety Commission).

Assuming a guest takes 3 rides during a visit to an amusement park, and assuming a total number of 900 million rides taken per year, the odds of being injured seriously enough to require hospitalization are 1 in 25 million (source: The International Association of Amusement Parks and Attractions).

Safety Suggestions

Here are some safety suggestions for families adapted from saferparks.org (run by consumer advocates concerned about ride safety) and www.iaapa.org (the website for the International Association of Amusement Parks and Attractions, which represents park owners):

Keep hands, arms, legs, and feet inside the ride at all times.

Point out riders who are following the rules, and those who aren't.

Talk with kids about how to behave on a ride. Ask questions to get them thinking about the consequences of foolish behavior. "What could happen if you unhooked your seat belt on a roller coaster? What could happen if you stuck your foot out as the car was approaching the platform?"

Ask yourself: "Do I fit comfortably in the restraint?" If you do not sit -- or fit -- in the seat properly, the safety restraint may not function properly.

If you tend to get nauseous in the back seat of a car, sit in the front of the ride.

Don't ride on a full stomach. Wait an hour after eating before getting on a ride.

Report any concerns you may have about the appearance or operation of a ride immediately to park management.

Fastest Roller Coasters Some roller coasters have gravitational forces, or G-forces, greater than what an astronaut experiences at liftoff. Among the biggest:

Millenium Force, Cedar Point, Sandusky, Ohio

At 310 feet, it's the world's highest. Riders fly down the first hill at 92 mph.

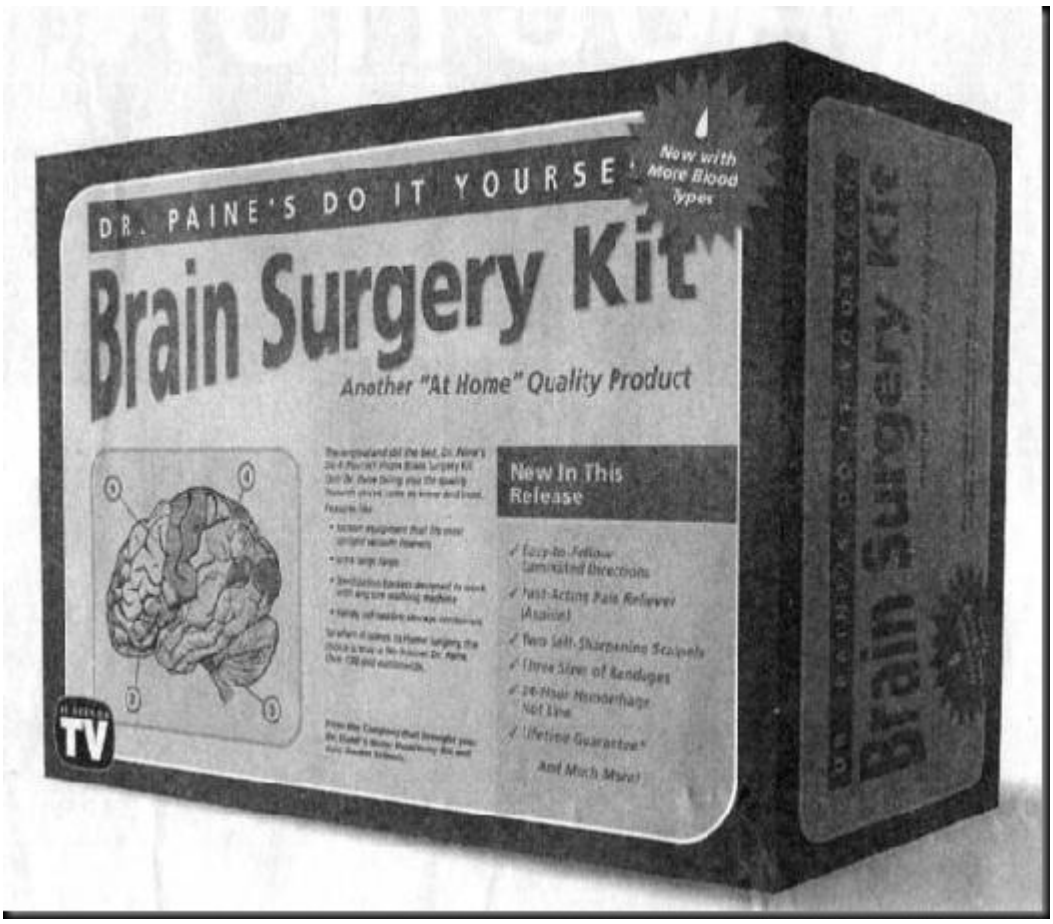
Goliath, Six Flags Magic Mountain, Valencia, California

225 feet high, 85 mph.

Superman Ride of Steel, Six Flags New England, Agawam, Massachusetts

208 feet high, 80 mph.




DR. PAINE'S DO IT YOURSE
Brain Surgery Kit
Another "At Home" Quality Product
Now with More Blood Types
New In This Release
✓ Easy-to-Follow Laminated Directions
✓ Fast-Acting Pain Reliever (Aspirin)
✓ Two Self-Sharpening Scalpels
✓ Three Sizes of Bandages
✓ 24-Hour Hemorrhage Hot Line
✓ Lifetime Guarantee*
And Much More!
TV
Brain Surgery Kit

Human Skin Cells Converted Directly into Functional Neurons

Columbia University Medical Center researchers have for the first time directly converted human skin cells into functional forebrain neurons, without the need for stem cells of any kind. The findings offer a new and potentially more direct way to produce replacement cell therapies for Alzheimer's and other neurodegenerative diseases. Such cells may prove especially useful for testing new therapeutic leads. The study was published in the August 4 online issue of the journal Cell.

In another first, the researchers used this method called direct reprogramming to generate neurons from skin cells of patients with familial (early-onset) Alzheimer's disease. The induced neurons were found to differ significantly from those made from healthy individuals, providing new insights into the development of the disease, reports study leader Asa Abeliovich, MD, PhD, associate professor of pathology & cell biology and neurology in the Taub Institute for Research on Alzheimer's disease and the Aging Brain at Columbia University Medical Center (CUMC).

In the 1980s and 90s, scientists realized that embryonic stem cells, because of their pluripotency (ability to develop into any kind of cell) and capacity for self-renewal, might be useful in regenerating or replacing tissue after injury or disease. However, the use of cells from human embryos raised ethical issues, triggering a search for alternatives.

A breakthrough came in 2007, when researchers determined how to genetically reprogram human skin cells to become induced pluripotent stem (iPS) cells, which are similar to naturally pluripotent cells. Although this advance allowed researchers to avoid using embryonic stem cells, iPS technology remains complex, inefficient, and time-consuming. Moreover, the pluripotent stem cells by their nature are capable of forming tumors, leading to potential safety concerns.

In 2010, Stanford University researchers reported turning mouse skin cells directly into neurons using transcription regulators (proteins that switch genes on or off), bypassing the need to create iPS cells.

Building on that work, Dr. Abeliovich and his team used a different combination of transcription regulators, plus several neuronal support factors, to convert human skin cells into forebrain neurons. The induced neurons appear to be the same as ordinary neurons, judging from electrophysiological testing and gene expression profiling. The researchers also showed that the neurons are able to send and receive signals in laboratory culture and when transplanted into the central nervous system of mice. These findings indicate that the induced neurons are capable of neuronal activity.

Direct reprogramming is fundamentally different from making neurons with iPS technologies, says Dr. Abeliovich. Using direct reprogramming, you could, in theory, take someone's skin cells and in a couple of weeks have fully functional neurons ready for replacement cell therapy.

Although the project is still at early stages and certainly not ready for clinical applications, therapies based on direct reprogramming seem more realistic than those based on iPS technology. What is particularly exciting, says Dr. Abeliovich, is that direct reprogramming is broadly applicable to the study and treatment of a host of neurological diseases.

In the second part of the study, Dr. Abeliovich compared neurons made from skin cells of healthy individuals with neurons made from patients with early-onset Alzheimer's disease. The latter cells exhibited altered processing and localization of amyloid precursor protein (APP) and increased concentration of amyloid beta, a component of APP (Alzheimer's is thought to develop when abnormal amounts of amyloid beta accumulate in the brain, eventually killing neurons.) APP was found to collect in the cells endosomes, cellular compartments that sort molecules for degradation or recycling. These findings suggest that this form of Alzheimer's is caused, at least in part, by abnormal endosomal function, the researchers report.

The young women had survived the car crash, after a fashion. In the five months since parts of her brain had been crushed, she could open her eyes but didn't respond to sights, sounds or jabs. In the jargon of neurology, she was judged to be in a persistent vegetative state. In crueler everyday language, she was a vegetable.

So picture the astonishment of British and Belgian scientists as they scanned her brain using a kind of MRI that detects blood flow to active parts of the brain. When they recited sentences, the parts involved in language lit up. When they asked her to imagine visiting the rooms of her house, the parts involved in navigating space and recognizing places ramped up. And when they asked her to imagine playing tennis, the regions that trigger motion joined in. Indeed, her scans were barely different from those of healthy volunteers. The woman, it appears, had glimmerings of consciousness.

Try to comprehend what it is like to be that woman. Do you appreciate the words and caresses of your distraught family while racked with frustration at your inability to reassure them that they are getting through? Or do you drift in a haze, springing to life with a concrete thought when a voice prods you, only to slip back into blankness? If we could experience this existence, would we prefer it to death? And if these questions have answers, would they change our policies toward unresponsive patients--making the Terri Schiavo case look like child's play?

The report of this unusual case last September was just the latest shock from a bracing new field, the science of consciousness. Questions once confined to theological speculations and late-night dorm-room bull sessions are now at the forefront of cognitive neuroscience. With some problems, a modicum of consensus has taken shape. With others, the puzzlement is so deep that they may never be resolved. Some of our deepest convictions about what it means to be human have been shaken.

It shouldn't be surprising that research on consciousness is alternately exhilarating and disturbing. No other topic is like it. As René Descartes noted, our own consciousness is the most indubitable thing there is. The major religions locate it in a soul that survives the body's death to receive its just deserts or to meld into a global mind. For each of us, consciousness is life itself, the reason Woody Allen said, "I don't want to achieve immortality through my work. I want to achieve it by not dying." And the conviction that other people can suffer and flourish as each of us does is the essence of empathy and the foundation of morality.

To make scientific headway in a topic as tangled as consciousness, it helps to clear away some red herrings. Consciousness surely does not depend on language. Babies, many animals and patients robbed of speech by brain damage are not insensate robots; they have reactions like ours that indicate that someone's home. Nor can consciousness be equated with self-awareness. At times we have all lost ourselves in music, exercise or sensual pleasure, but that is different from being knocked out cold.

Motor Skill Learning May be Enhanced by Mild Brain Stimulation

People who received a mild electrical current to a motor control area of the brain were significantly better able to learn and perform a complex motor task than those in control groups. The findings could hold promise for enhancing rehabilitation for people with traumatic brain injury, stroke and other conditions.

The study is presented in the January 20, 2009 early online edition of the Proceedings of the National Academy of Sciences*, and was conducted by researchers at the National Institutes of Health (NIH). The research team from NIH's National Institute of Neurological Disorders and Stroke (NINDS) worked in collaboration with investigators at Columbia University in New York City and Johns Hopkins University in Baltimore.

Motor skills, which are used for activities from typing and driving, to sports, require practice and learning over a prolonged period of time. During practice, the brain encodes information about how to perform the task, but even during periods of rest, the brain is still at work strengthening the memory of doing the task. This process is known as consolidation.

"Our results show that overnight consolidation of a motor skill is enhanced by mild stimulation to the primary motor cortex. Although our study involved healthy participants, this technique potentially could be used to help people with brain injuries relearn or acquire motor skills," said Leonardo G. Cohen, M.D., a senior investigator at NINDS and a study author.

Subjects in this study were presented with a novel and challenging motor task, which involved squeezing a “joy stick” to play a targeting game on a computer monitor, which they practiced over five consecutive days. During practice, one group received 20 minutes of transcranial direct current stimulation (tDCS) and the other group received only a 30 second “sham” stimulation. tDCS involves mild electrical stimulation applied through surface electrodes on the head, and works by modulating the excitability, or activity, of cells in the brain's outermost layers. In this study, Dr. Cohen and his team directed tDCS to the primary motor cortex, the part of the brain that controls movement.

The study is the first to look at the effectiveness of tDCS on motor skill learning and retention at several different stages of the learning process—during the practice sessions, (online); between the sessions, (offline); and three months after the training ended, which enabled the investigators to measure long term retention of the skill. The most dramatic effects were seen in the offline period, indicating that the stimulation had a marked effect on consolidation.

Over the five-day training period, the skill of the tDCS group improved significantly more that that of the control (sham) group, with most of the improvement occurring offline. During the three month follow-up period, the two groups forgot the skill at about the same rate, but the tDCS group continued to perform better because they had learned the skill better by the end of training.

-By ***Margo Warren***

CTVNews.ca Staff

The issue of head injuries has been a topic of debate in sports such as hockey, football and boxing. Now, researchers are raising concerns about the brain health of players in another sport: soccer.

Researchers in the U.S. recently completed brains scans on soccer players who regularly "head" the ball and say they found subtle signs of brain damage in many of them -- raising concerns about whether the practice is safe, especially in chldren.

Using a form of brain imaging called diffusion tensor imaging, researchers from the Albert Einstein College of Medicine at Yeshiva University in New York studied 38 amateur soccer players with an average age of 31, all of whom had played soccer since childhood.

They found that those players who said they head the ball frequently had changes in their brains that were similar to those seen in traumatic brain injury patients.

Dr. Michael Lipton and his team were looking for something called fractional anisotropy, which is the movement of water molecules along brain axons. In healthy white matter brain tissue, the direction of water movement is fairly uniform and measures high in FA. When water movement is more random, FA values decrease.

Players who headed most frequently had significantly lower FA in brain regions that are responsible for attention, memory, executive functioning.

In a related study, Dr. Lipton and colleague Molly Zimmerman gave the same 38 players memory tests and found that the players with the highest annual heading frequency performed worse on tests of verbal memory and psychomotor speed, which are activities that require mind-body co-ordination, like throwing a ball, relative to their peers.

Lipton says the findings are worrying but further study is needed to determine what the long-term consequences of excessive head hits might be.

"At this point in time, we clearly have evidence that heading may be related to changes similar to brain injury, but it is not such hard and clear information that we can make a clear recommendation about heading," Lipton said.

When players hit the ball with their heads, it's not an impact that breaks nerve fibres in the brain. But repetitive heading could set off responses that lead to brain cell degeneration.

The results of the study were presented at the annual meeting of the Radiological Society of North America and have not been peer-reviewed.

The findings are concerning given that soccer is such a popular sport, especially among children.

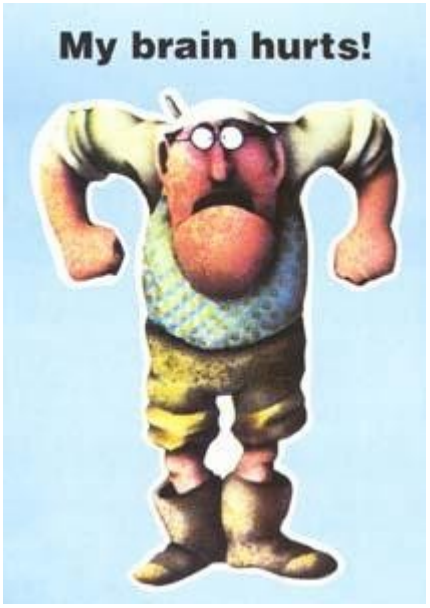
Three years ago, brain injury specialists with the non-profit group ThinkFirst identified heading as a possible safety issue, and drew up guidelines on how to headhit the ball safely. Their number one rule was not to teach the skill too early to children.

"So anybody out there who's listening to this who has a child less than 10, do not teach that child to head the ball. Then if they are of the appropriate age, which is 10 to 12, then they can start learning how to head the ball with the appropriate sized ball," ThinkFirst founder Dr. Charles Tator tells CTV News.

Since heading is an integral part of soccer and unlikely to be eliminated from the game, Lipton and his colleagues want to determine if they can find a safe threshold of heading hits.

So far, they've found that players who said they headhit the ball more than 1,000 to 1,500 head per year were among those who had the most significant signs of brain injury. While 1,000 times a year may seem high, it amounts to only a few times a day for a regular player.

With a report from CTV medical specialist Avis Favaro and producer Elizabeth St. Philip


My brain hurts!


I had brain surgery.
What's your excuse?

Depression Drugs -- SSRIs -- May Reorganize Brain Plasticity, New Research Suggests

Selective serotonin reuptake inhibitors (SSRI) such as Prozac are regularly used to treat severe anxiety and depression. They work by immediately increasing the amount of serotonin in the brain and by causing long term changes in brain function. However it can take weeks of treatment before a patient feels any effect and both beneficial effects and side effects can persist after treatment is stopped.

New research published by BioMed Central's open access journal Molecular Brain investigates physiological changes within the brain that may be caused by SSRI treatment.

The hippocampus is an area of the brain involved in long term memory and spatial awareness, and is involved in symptoms afflicting people with Alzheimer's disease, such as loss of memory and disorientation. Neuronal cells in the hippocampus can change their activity and strength of connections throughout life, a process known as plasticity, which thought to be one of the ways new memories are formed. Altered plasticity is often associated with depression and stress.

Researchers from the Department of Pharmacology, Nippon Medical School, showed that chronic treatment of adult mice with fluoxetine (Prozac) caused changes to granule cells, one of the main types of neuronal cells inside the hippocampus, and to their connections with other neuronal cells. The granule cells appeared to undergo serotonin-dependent 'dematuration', which increased their activity and reversed adult-type plasticity into an immature state. These changes to the cell's plasticity were associated with increased anxiety and in alternating between periods of hyper or hypo activity.

Katsunori Kobayashi explained, "Some of the side effects associated with Prozac in humans, such as anxiety and behavioral switching patterns, may be due to excessive dematuration of granule cells in the hippocampus."

Mild hypothermia therapy for patients with severe brain injury

Gal R, Cundrle I, Zimova I, Smrcka M.

Source

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The authors present a group of patients with severe head injuries in which deliberate mild hypothermia was carried out together with the standard treatment protocol according to the European Brain Injury Consortium. Thirty patients with severe head injuries with Glasgow Coma Scale (GCS) score of 3-8 were enrolled into the study. The subjects were divided into two groups. The average age in the hypothermic group of 15 patients was 35 years. The average GCS was 4.5 at the site of accident. Eight patients (53%) sustained associated severe injuries of other organs. The average age of the 15 patients in the normothermic control group was 39 years with an average GCS of 4.3. All the patients in the normothermic group and 11 patients in the hypothermic group underwent neurosurgery, five of them also decompressive craniotomy. Artificial ventilation with continuous monitoring of intracranial pressure (ICP), cerebral perfusion pressure (CPP), arterial blood pressure, jugular bulb oximetry and urinary bladder temperature were instituted in the ICU. Cooling to a core temperature of 34 degrees C in the hypothermic group was achieved by forced air cooling in combination with circulating-water mattress cooling (Blanketrol II, Cincinnati Sub-Zero) and maintained for 72 h. The difference in the Glasgow Outcome Scale (GOS) between the hypothermic and normothermic groups of patients after 6 months was not statistically significant (P value 0.0843). In the hypothermic group, however, good neurological outcome (GOS 4 and 5) was reached in 13 patients (87%), which represents a 40% increase compared with the normothermic control group in which good neurological outcome was reached in 7 patients (47%). Mean normothermia ICP value of 18+/-2 mmHg was significantly (P value 0.0007) reduced during mild hypothermia therapy to 12+/-2 mmHg. Mean normothermia CPP value of 72+/-3 mmHg significantly increased (P value 0.0007) during this time to 80+/-4 mmHg with unchanged systolic arterial pressure (P value 0.9013). There were no cardiac or coagulopathy-related complications. Our results showed that mild therapeutic hypothermia could be useful in improving the outcome and neurological recovery in patients with severe head injuries.

PRIDE and UFC fighter suffers from brain damage raises questions about Safety

A recent feature article on Gary Goodridge in a Canadian newspaper, which revealed that the former PRIDE and UFC fighter is suffering from brain damage, has prompted some discussion about the dangers of MMA. And it's not about the risk of a one off strike that kills or maims, it's a more subtle damage: CTE, Chronic Traumatic Encephalopathy, the gradual process of brain damage that can affect an athlete when their days in the ring or on the field are over, that can't be detected on a regular brain scan. It's a problem that has drawn media interest in the US (in relation to American football) and in Australia (in relation to the NRL). Of course, it should be an area of concern in combat sports too.

The long term effects of the sport on Gary Goodridge aren't a perfect indicator of the risks of participating in mixed martial arts or what's to come for most fighters; Goodridge has taken on fights in kickboxing and MMA recklessly for years, long since a wise fighter would have retired. Fighters who've been in the game for as long like Couture and Nogueira (who's taken far more punishment in his fights than most) still have their minds in tact.

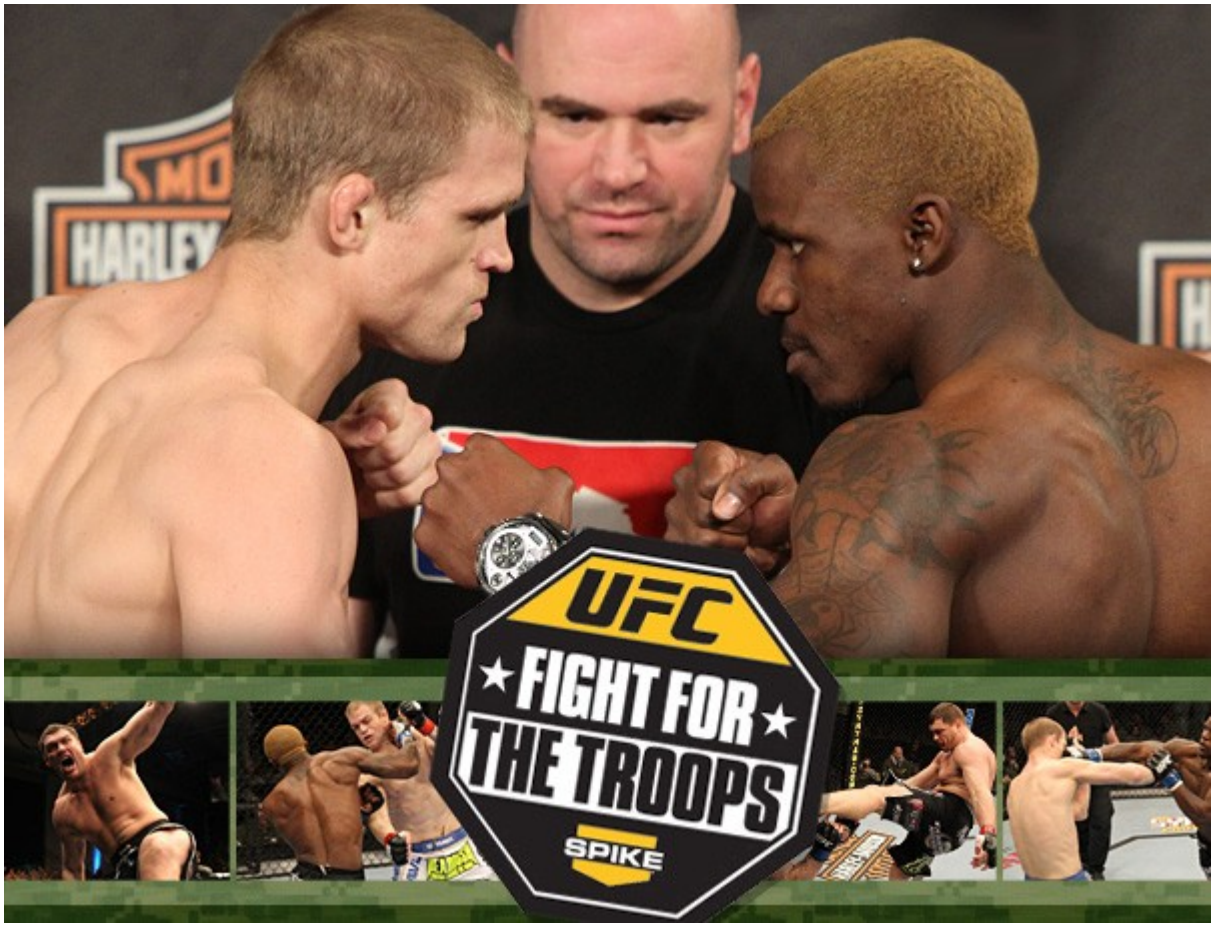
The two reputable studies conducted on MMA support the idea that MMA is safe, relative to other combat sports. One study done by a leading American University suggested the risk of brain injury is lower in MMA than in boxing owing to the lower rate of knockouts. Similarly, a study published in the British Journal of Sports Medicine found that 28% of MMA matches ended in a blow to the head, compared to 40% for boxing. It's worth noting, however, that it doesn't take a knockout to cause brain damage. That's been a key point of the recent media and medical discussion about the risk of contact sports: even "subconcussive" blows, that is, blows that might daze, but not KO, can be harmful for certain athletes over time. In favour of MMA is the fact that, under the UFC's regulation, a concussed fighter must wait at least 45 days before fighting again, giving the fighter a chance to recover. No such precaution exists in the NRL, where high-impact concussions are common.

So, while MMA isn't the only sport to blame and other sports may have the same problem to a greater extent, what is known about how long term brain damage works suggests that, for some fighters, there are likely to be some risks from long term competition. There's still a lot that's uncertain about the workings of this kind of brain damage in general, and in MMA specifically. So more research into the sport's potential effects on the brain, like the UFC's recent commitment to a three-year-study monitoring trauma to fighter's brains, is a good thing and can only help in establishing how to keep the sport as safe as possible, and ensuring stories like Gary Goodridge's are the exception to the rule.

UFC Fight for the Troops: Curing brain injuries, with other brain injuries

The Ultimate Fighting Championship puts on an annual event benefitting the Intrepid Fallen Heroes Fund. Early estimates of donations raised are reportedly north of $5 million, with over half a million dollars being donated over the phones alone. Apart from benefitting a good cause, this show is always a blast to watch because The UFC matchmakers book fighters who have family members in the US armed services and are itching to put on an explosive performance to honor the U.S. military.

Mixed between the fights on the live broadcast are touching montages of war heroes who have sustained life-altering brain injuries while serving the country overseas. One can't help but see the irony however as in an effort to raise money for the cause, these fighters line up to get punched in the head repeatedly.



Biologists Discover Genes That Repair Nerves After Injury

— Biologists at the University of California, San Diego have identified more than 70 genes that play a role in regenerating nerves after injury, providing biomedical researchers with a valuable set of genetic leads for use in developing therapies to repair spinal cord injuries and other common kinds of nerve damage such as stroke.

In the September 22 issue of the journal Neuron, the scientists detail their discoveries after an exhaustive two-year investigation of 654 genes suspected to be involved in regulating the growth of axons -- the thread-like extensions of nerve cells that transmit electrical impulses to other nerve cells. From their large-scale genetic screen, the researchers identified 70 genes that promote axon growth after injury and six more genes that repress the re-growth of axons.

"We don't know much about how axons re-grow after they're damaged," said Andrew Chisholm, a professor of biology at UC San Diego. "When you have an injury to your spinal cord or you have a stroke you cause a lot of damage to your axons. And in your brain or spinal cord, regeneration is very inefficient. That's why spinal cord injuries are basically untreatable."

Chisholm and UC San Diego biology professor and HHMI Investigator Yishi Jin headed the collaborative research team, which also included researchers from the University of Oregon.

While scientists in recent decades have gained a good understanding of how nerve cells, or neurons, develop their connections in the developing embryo, much less is known about how adult animals and humans repair -- or fail to repair -- those connections when axons are damaged.

"There are many processes not involved in early development that are involved in switching the neurons to this re-growth mode," said Chisholm. "In essence what we found are genes that people had not suspected previously to be part of this process."

Of particular interest to the UC San Diego biologists are the six genes that appear to repress the growth of axons.

"The discovery of these inhibitors is probably the most exciting finding," said Chisholm, because identifying and eliminating the inhibiting factors to the re-growth of axons could be just as essential as the biochemical pathways that promote axon re-growth in repairing spinal cord injuries and other kinds of nerve damage.

The scientists were also surprised to learn that some of the genes they found to be involved in the re-growth of axons were known to have other functions, such as regulating the release of neurotransmitters.

"This was in large part unexpected," said Chisholm. "These genes had not been implicated in the re-growth of axons before."

To find the 76 genes, the researchers conducted painstaking experiments on more than 10,000 tiny laboratory roundworms known as C. elegans. The first step involved developing genetic mutants of these transparent roundworms for each one of 654 genes that were suspected to play a role in the regulation of axon regrowth in worms, fruit flies and mice. They then labeled the roundworm neurons with green fluorescent protein and, with a precise surgical laser, damaged a specific axon.

"The goal was to study this process in its simplest form," said Chisholm. "Because the animals are essentially transparent, we can see the axons expressing this green fluorescent protein."

By examining the re-growth, or lack of growth, of the damaged axon 24 hours later, the scientists were then able to determine which of these 654 genes were actually important to axon re-growth.

Chisholm said that while the 76 genes identified are believed to have similar roles in mammals as well as roundworms, because their functions were "conserved" by the organisms through evolution, he and his research team are now collaborating with other investigators to conduct experiments on mice to verify this connection and determine which of these genes are the most critically important.

"Worms are clearly different from mammals," he added. "But there will be a core of conserved molecules doing the same job."

In addition to Chisholm and Jin, the UC San Diego biologists involved in the study were Lizhen Chen, Zhiping Wang, Anindya Ghosh-Roy, Thomas Hubert, Dong Yan, and Zilu Wu. Sean O'Rourke and Bruce Bowerman from the University of Oregon were also part of the team.

The research project was supported by grants from the National Institutes of Health and the Howard Hughes Medical Institute.

Persons with a brain injury can benefit from music as a modality to promote vocalization, rhythmic movements, orientation, relaxation, self-expression, and as a way to enhance overall self- esteem. Because music is processed by the entire brain, the structure of music helps to re-organize the structure of the brain. Listening to highly organized music such as that of Mozart often helps brain injured patients to organize their thoughts, activities and even their emotions.

My Child Doesn't Have a Brain Injury, He Only Has a Concussion

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OBJECTIVE: The term “concussion” is frequently used in clinical records to describe a traumatic head injury; however, there are no standard definitions of this term, particularly in how it is used with children. The goals of this study were to examine the clinical correlates of the concussion diagnosis and to identify the factors that lead to the use of this term in a regional pediatric center.

METHODS: Medical data were prospectively collected from 434 children with traumatic brain injury who were admitted to a Canadian children's hospital. A proportional hazards regression was used to examine the association of the concussion diagnosis and the times until discharge and school return. A classification-tree analysis modeled the clinical correlates of patients who received a concussion diagnosis.

RESULTS: The concussion label was significantly more likely to be applied to children with mild Glasgow Coma Scale scores of 13 to 15 (P = .03). The concussion label was strongly predictive of earlier hospital discharge (odds ratio [OR]: 1.5; 95% confidence interval [CI]: 1.2–1.9; P = .003) and earlier return to school (OR: 2.4 [95% CI: 1.6–3.7]; P < .001). A diagnosis of a concussion was significantly more likely when the computed-tomography results were normal and the child had lost consciousness.

CONCLUSIONS: Children with mild traumatic brain injuries have an increased frequency of receiving the concussion label, although the label may also be applied to children with more-severe injuries. The concussion diagnosis is associated with important clinical outcomes. Its typical use in hospital settings likely refers to an impact-related mild brain injury, in the absence of indicators other than a loss of consciousness. Clinicians may use the concussion label because it is less alarming to parents than the term mild brain injury, with the intent of implying that the injury is transient with no significant long-term health consequences.

Why were men given larger brains than dogs?

1) So they wouldn't hump women's legs at cocktail parties.
2) So they wouldn't stop to play with every other man they see when you take them around the block.

Healing and Harming Sounds

by *Karen Stollznow*

Pavarotti singing Nessun Dorma from Puccini's Turandot can bring people to tears, but can the tenor's voice heal too? Can sounds both cure and kill? Let's investigate some claims about healing and harming sounds.

Many people seem to think there's something magical about human speech; for example, the belief that uttering spells and prayers can bring about an effect in the external world. Some practitioners even claim to be able to cure disease using the human voice. As usual, there are many names for the claims: Bioacoustics, Sound Therapy, Sound Work and Sound Medicine. All of these methods purport to harness the alleged healing power of our own voices. One proponent, Paul Newham, believes that good health requires not only a sensible diet and exercise, but also singing. His book The Singing Cure teaches "Voice Movement Therapy," a series of exercises based on "vocal healing traditions" from indigenous cultures.1 Newham claims the voice is a powerful healing instrument that can be used to tame anger, grief, shame and other negative emotions.

One "certified therapist" in Voice Healing conducts sessions of singing to reduce stress, ease pain and create a "cellular level of healing": This powerful healing technique which dates back to ancient civilizations and new scientific researches, will enable you to use the power of your voice vibration to improve your health and life. This course is for everybody; the human voice is a very powerful tool. it was not only created to speaking or singing, but also to heal and help each one of us (having a beautiful voice is not relevant) to achieve a state of greater self awareness. Once we get to know our voices with the help of intensive training we will be able to cure ourselves from many disturbing diseases and multiple pains caused by stress, such as insomnia, migraine, abdominal pain, heart problems, sinusitis, cold flu, and more…2

The Discovery Channel television series Mythbusters proved that with the right frequency and volume, and when sustained, it is possible to shatter glass with the human voice.3 However, no note is going to cure the common cold. Like mantras and meditation, singing only has subjective benefits for the individual. Another therapist uses the voice in conjunction with music, drums, quartz crystal bowls and tuning forks, to return our voices to their "healthy state of resonance":

We arrive on this planet with every thing that we need to heal ourselves, and when we came; our voices were rich with all the necessary frequencies to maintain us in a healthy state of resonance. Due to the conditioning of childhood and the suppression of our true thoughts and feelings and the accompanying sounds that go with them, by the time we arrive at adulthood our speaking voice no longer contains the same frequencies it did as a child. Our voice will always reflect our current mental and emotional states of being. When a person feels alive, healthy, happy and abundant, their voice sounds much different than if they are depressed, unhappy, angry or afraid. You may notice a difference in your own voice when speaking your truth compared to when you are not, it feels different in your body as well, and from an energetic standpoint the cells of your body are not getting the frequencies they need to stay healthy.

Consistent with the beliefs of other holistic therapies such as naturopathy, this therapist claims that we all have a natural healthy state to which we can return using the body's innate ability to heal itself.

To return to this inherent state of health, Alfred A. Tomatis experimented with the most seminal of sounds—a mother's voice. To his patients, Tomatis played recordings of their mother's voices to treat a variety of disorders, including dyslexia, autism and depression. He also used Gregorian chants and music by composer Wolfgang Amadeus Mozart. To this day, proponents of the Tomatis Method claim his listening techniques treat learning difficulties, and assist in learning second languages, developing better communication skills and improving creativity.5

By now, the idea of using Mozart music might be sounding familiar. Don Campbell took Tomatis' research further with his book The Mozart Effect: Tapping the Power of Music to Heal the Body, Strengthen the Mind, and Unlock the Creative Spirit. Campbell believes that listening to Mozart music boosts intelligence, and in The Mozart Effect for Children he claims that exposing children to classical music increases brain development.

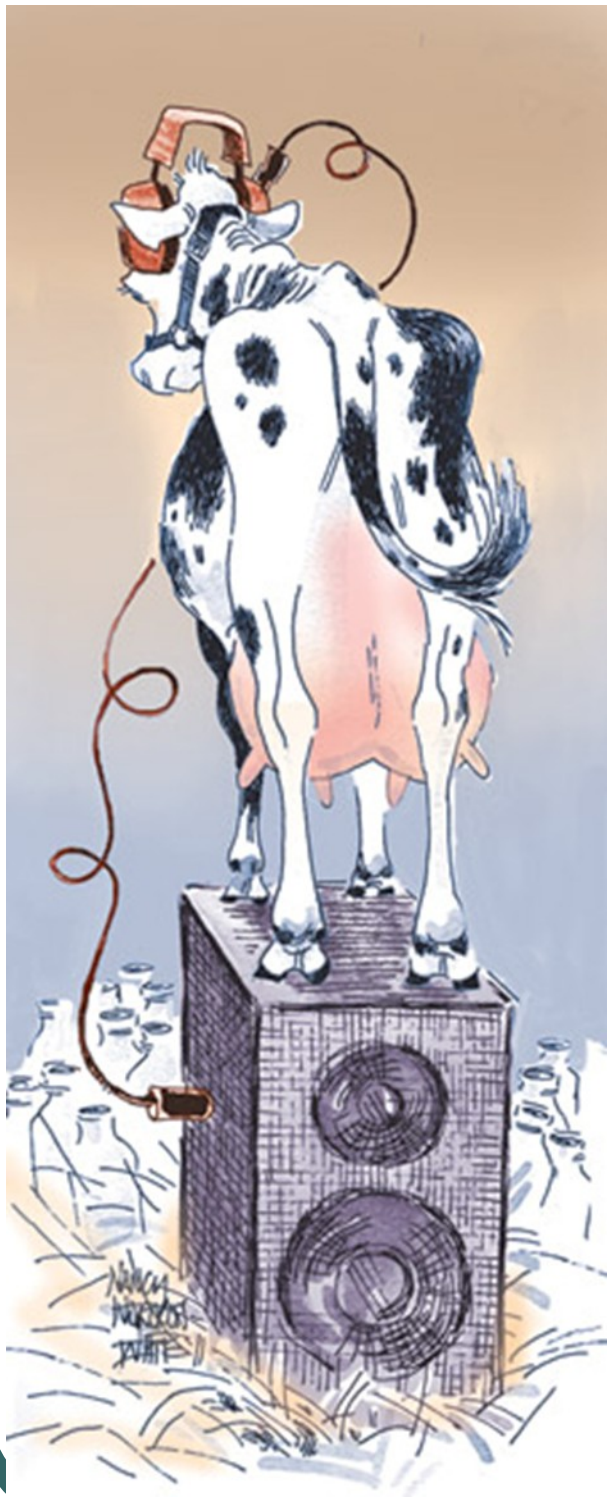
Campbell's theory was popularized before it could be (dis)proven. The mere claim led then Governor of Georgia, Zell Miller, to propose issuing the parents of newborn children with a CD of classical music.6 In an effort to produce more milk, a dairy farmer in Spain plays Mozart during milking time, in what is affectionately known as the Moozart Effect.7

However, research does not support the claim that listening to Mozart can enhance spatial performance.8 Furthermore, there is no evidence to support Campbell's additional claims that his therapy treats a range of conditions including autism, dyslexia and Attention- Deficit Hyperactivity Disorder (ADHD).9 Much like the "we only use 10% of our brains" myth, the belief that "listening to Mozart makes you smarter" has outlived its debunking.

Again, any benefits of listening to classical music are based in perception, like taste in music. One person's Mozart is another person's Metallica. Similarly, there is no music that will literally "expand your mind" like the claims of Squareeater that their psychedelic music "stimulates the brain to lead users to the furtherest edges of the conscious mind." Music isn't always used to soothe the savage beast; sometimes it's used as a torture tactic. There was a curious soundtrack to the 1993 Waco siege of David Koresh and his disciples. When negotiations failed, the Federal Bureau of Investigation surrounded the Branch Davidian ranch and blasted high-decibel music into the compound to subdue the occupants. The bizarre playlist included Tibetan chants, Christmas carols, bugle calls and Nancy Sinatra's These Boots Are Made for Walkin'. Like Charles Manson, Koresh fancied himself a rock star, and retaliated by playing tapes of his own compositions, until the electricity was cut off….

U.S. soldiers unleashed this rock 'n' roll warfare during the 1989 invasion of Panama. A cacophony of Styx, Judas Priest, Black Sabbath, and a version of God Bless the U.S.A. was blasted into the papal nunciature—Manuel Noriega's hiding place—until the Vatican put an end to the concert. Closer to home, classical music is pumped into the PA systems of some shopping malls in an attempt to lower crime and deter teenagers from loitering (because Beethoven isn't cool). Sometimes earplugs aren't enough. Sonic weapons are coming out of science fiction and into use for defense and law enforcement. Instruments such as Long Range Acoustic Devices (LRAD) are used as hailing devices and in crowd control efforts. An LRAD was even used to ward off a group of pirates off the coast of Somalia. High-power sound waves can be used to incapacitate a victim, and can cause disorientation, discomfort and nausea.

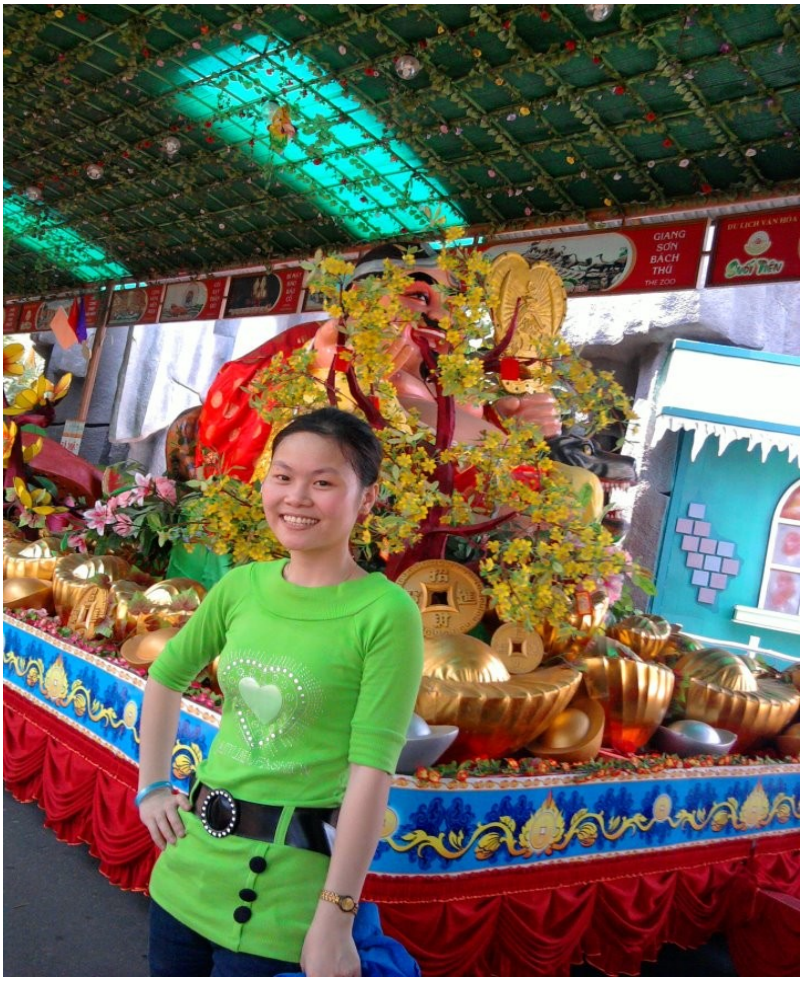
The very technology used to harm may be used to heal. Researchers at the California Institute of Technology have created “sound bullets” that could eventually be used to obliterate kidney stones or destroy cancerous cells without damage to surrounding tissue.11 The device is based on the old toy Newton’s Cradle, and creates concentrated sound waves from ball bearings.



In experimental research, sound waves are being used to treat prostate cancer. In a study conducted at the University College Hospital and Princess Grace Hospital in London, High Intensity Focused Ultrasound (HIFU) is used to kill cancerous cells. The results are promising; the cancer was treated successfully, with fewer side effects than chemotherapy.12

As we can see, there are some legitimate applications for sound technology, but there are many pseudoscientific theories about speech and sound. The claims that singing can cure disease and listening to music can make you smarter are just a load of hot air.

Once again the Powell River Brain Injury Society is playing host to two Canada World Youth participants. This year we welcome Nicole and Ha, from Ontario and Vietnam respectively.



Time to Examine Rear-Facing Infant Seat Safety Improvements?

That an infant seat should be placed in the rear-seat of the car, facing rearwards is an article of faith, preached by the National Highway Traffic Safety Administration and the American Academy of Pediatricians. Manufacturers only make rear-facing infant seats.

On its website, NHTSA advises:

“A rear-facing car seat is the best seat for your young child to use. It has a harness and in a crash, cradles and moves with your child to reduce the stress to the child’s fragile neck and spinal cord. Your child under age 1 should always ride in a rear-facing car seat.”

But Transport Canada researcher Suzanne Tylko presented data at the biennial Enhanced Safety of Vehicles conference that questions the certainty of that policy. Transport Canada has been at the forefront of child motor vehicle crash safety research. In particular, the agency’s dynamic testing has yielded important insights. In this three-year study, TC tested 131 child restraints in 85 motor vehicle crash tests. The vast majority were rigid barrier tests on rear-facing infant seats, secured by a three-point belt conducted at speed of 48km/h; 11 were conducted at 56 km/h; and seven were conducted at 40 km/h. TC also tested seats in offset deformable barrier tests, conducted at 40 km/h. (Fourteen tests involved convertible seats installed facing the rear.)

The tests showed elevated head accelerations above 80g in 18 percent of the tests with a significant number occurring in the rear center seating position. There were four areas of impact: direct head contact with the rear seat back in front of the dummy; contact between the child restraint and the forward seat back; dummy head contact with the carry handle; and child seat with the center console between the front seats.

Transport Canada began to investigate the head protection offered by infant seats, when initial tests showed elevated head responses – some Head Injury Criterion values for the infant dummies, as high as 100g. Their observations have recently been buttressed by a May 2010 study by NHTSA’s National Center for Statistics and Analysis, citing head injuries as being the most common injury type for children in crashes. The study examined injuries to children ages seven and under, and found that the head was commonly injured region of the body, but infants under one year of age had a greater incidence of head injury than older children aged one to seven. Infants were more likely to have sustained a concussion or be rendered unconsciousness in a crash; 70 percent of children under 1 year old sustained AIS+2 head injuries.

The study pointed out that head injuries in children have long-range societal impacts:

“For example, children who suffer traumatic brain injuries can experience lasting or late-appearing neuropsychological problems, highlighting the need for careful monitoring of children as they grow older. For this reason, head injuries are of particular concern when studying children injured in motor vehicle traffic crashes. In children, some neurological deficits after head trauma may not manifest for many years. Frontal lobe functions, for example, develop relatively late in a child’s growth, so that injury to the frontal lobes may not become apparent until the child reaches adolescence when higher level reasoning develops. Since the frontal lobes control social interactions and interpersonal skills, early childhood brain damage may not manifest until such frontal lobe skills are called into play later in development. Likewise, injury to reading and writing centers in the brain may not become apparent until the child reaches school age and shows signs of delayed reading and writing skills.”

In three years of testing, Transport Canada confirmed their earlier findings. In several cases they saw the back of the infant seat slamming into the back of the front seat backs or the infant dummies ramping up their seat back, allowing the head to contact the back of the front seat backs, again, resulting in high HICs. In some instances, the carry handle interacted with the front seat back and broke off hitting the infant dummy in the head. The center position also revealed vulnerabilities – the back of infant seat and dummy head would hit the center console between the front two seats.

Larger infant seats slammed into the front seat backs harder. Researchers examined the effect of changing the clearance between the front seat back and the infant seat and found that with more clearance, there was more opportunity for the child to pick up speed, resulting in even higher HICs. With no clearance, as in most small cars, the seat is braced and had much better performance. Infant seats performed significantly better, if they were secured by universal anchorage systems, known in the U.S. as LATCH (Lower Anchors and Tethers for Children), because there was less excursion.

She took automakers to task for failing to install energy-absorbing seat backs. She criticized child restraint manufacturers for not installing energy absorbing padding on the infant seats, not even in the head area – only cover-over comfort foam over the hard plastic shell.

Tylko concluded: "The protection of an infant should be based on the same principles that are used to guide helmet design for head protection. The shell serves to distribute or spread the load over a large surface and the energy absorbing foam, crushes or deforms on impact to absorb the energy of the impact. To be effective, and reduce the risk of head injury, the foam must deform instead of the skull. If the foam is too stiff (high density) it will require too much energy to crush and the skull will deform. If the foam is too soft (low density) then the foam will bottom out and fail to absorb enough energy to prevent head injury. An impact test carried out with an instrumented head form or dummy can evaluate the effectiveness of the shell and foam liner combination by providing a measure of the amount of energy that is transmitted to the head during an impact."

The real problem, however, is the lack of standards and dynamic testing, she said. The head injury criterion isn't a very useful data point when the child seat is tested in a sled test, and there is no front seat back to provide the point of impact that would exist in a real-world crash. Tylko says that dynamic testing exposes hazards that would remain hidden in a sled test.

In lieu of standards, or industry initiative, Tylko says that the best advice for parents is not to place rear-facing infant seats in the center position and to use the LATCH system on either of the outboard seats.

NEURAL FEEDBACK

THE BRAIN GENERATES AN ELECTRIC FIELD THAT INFLUENCES ITS OWN ACTIVITY

Your brain is electric. Tiny impulses constantly race among billions of interconnected neurons, generating an electric field that surrounds the brain like an invisible cloud. A new study published online in Neuron suggest that the brain's electric field is not a passive by-product of its neural activity, as scientists once thought. The field may actively help regulate how the brain functions., especially during deep sleep. Although scientists have long known that external sources of electricity (such as electroshock therapy) can alter brain function, this is the first direct evidence that the brain's native electric field changes the way the brain behaves.

In the study, Yale University neurobiologists David McCormick and Flavio Frohlich surrounded a still-living slice of ferret brain tissue with an electric field that mimicked the field an intact ferret brain produces during slow-wave sleep. The applied field amplified and synchronized the existing neural activity in the brain slice. These results indicate that the electric field generated by the brain facilitates the same neural firing that created the field in the first place, just as the cloud of enthusiasm that envelopes a cheering crowd at a sports stadium encourages the crowd to keep cheering. In other words, the brain's electric field is not a by-product; it is a feedback loop.

Although researchers knew that periods of highly synchronized neural activity (such as that of deep sleep) are crucial for maintaining normal brain function, exactly how these stable phases are coordinated-and why they go awry in disorders such as epilepsy-was never clear. The new study indicates scientists may find some answers in the surprisingly active role of the brain's electric field.

"I think this is a very exciting new discovery," says Ole Paulson, a neuroscientist at the University of Cambridge who was not involved in the study. "We knew that weak electric fields would impact brain activity, but what no one had really tested before was whether electric fields produced by the brain itself could influence its own activity."

Frohlich sees therapeutic applications as well, particularly in improving a promising technique called transcranial direct-current stimulation (tDCS), which applies weak electric fields to the scalp to treat, for example, depression and chronic pain. Traditionally tDCS uses standard electric fields that do not change much, as opposed to the dynamic electric fields used in the new study to mimic a living brain. "the next logical step is to use these more complex waveforms in a clinical setting and see if they improve the treatment," Frohlich says.

THE MAD ARTIST'S BRAIN

MORE EVIDENCE FOR THE LONG-SUSPECTED PHYSIOLOGICAL LINK BETWEEN INVENTIVENESS AND MENTAL ILLNESS

The popular perception of creative thinkers and artists is that they often also have mental disorders-the likes of Vincent van Gogh or Sylvia Plath suggest that creativity and madness go hand in hand. Past research has tentatively confirmed a correlation; scientific surveys have found that highly creative people are more likely to have mental illness in their family, indicating a genetic link. Now a study from Sweden is the first to suggest a biological mechanism. Highly creative healthy people and people with schizophrenia have certain brain chemistry features in common. A research team at the Karolinska Institute in Stockholm studied 13 mentally healthy, highly creative men and women. As noted in the paper published in May in Plos One, other scientists had previously found that divergent thinking, or the ability to "think outside the box," involves the brain's dopamine communication system. The Swedish research team used PET scanning to determine the abundance of a particular dopamine receptor, or sensor, in the creative individuals' thalamus and striatum, areas that process and sort information before it reaches conscious thought-and that are known to be involved in schizophrenia. The team found that people who had lower levels of dopamine receptor activity in the thalamus also had higher scores on tests of divergent thinking-for instance, finding many solutions to a problem. Previous work has shown that people with schizophrenia also have lower dopamine receptor activity in the thalamus-and the scientists suggest in their paper that this striking similarity demonstrates a "crucial" link between creativity and psychopathology. "Thinking outside the box might be facilitated by having a somewhat less intact box, " writes lead author Fredrik Ullen, a cognitive scientist at Karolinska.

Chocolate brains

From the Desk of Debbie Dee:

Wow…the final newsletter produced under the Opportunities Fund program. This year has gone by quickly. I have very much enjoyed watching Melissa and Josh flourish and grow in their respective roles.

We have a great format for our newsletter and will be counting on Josh to continue on with producing it for us as well as assisting him to find other organizations to contract with to produce a newsletter for them. His sense of humor has been infectious and we have had many a laugh reading the content he included (or sometimes blank pages with one or two words or even upside down and backwards) in the newsletter. Josh worked diligently to research topics and choose themes for each newsletter. I believe he included a good blend of interesting topics related to brain injury, rehabilitation, prevention and the on going programming here at the Centre. He also included his peers and had articles written by them. This has been a very successful project and we wish Josh the best of luck as he continues to pursue his writing. He will still be a frequent visitor to the Centre so we won't have to say good bye…I just won't get to boss him around anymore!

Melissa has turned a messy and unorganized wall full of books into a neat and organized library with a system that we can all use. She has been very motivated and creative in learning the Dewey decimal system and also by learning the library thingy online and other ways to organize our shelves and our selves! She has learned a lot during the past year and has gone through a lot of emotional growth…I am very proud of Melissa and the work she has done. We are helping her to complete her resume so she can help other organizations in our community to get their shelves in order! No matter if she works for us or not I will continue to boss her around!

Best of luck to both of you…see you at the board table for art day!

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