http://www.scientificamerican.com/article.cfm?id=why-do-we-use-facial-expressions

Why do we use facial expressions to convey emotions?

By Mark A. W. Andrews Monday, November 8, 2010 2

Mark A. W. Andrews, director and professor of physiology at Lake Erie College of Osteopathic Medicine at Seton Hill University in Greensburg, Pa., replies:

Just as a picture is worth a thousand words, our faces can express a wealth of information. The ability to communicate subtle emotions with a simple raised eyebrow or curl of the lip may be innate. Charles Darwin was one of the first to propose this theory in his book The Expression of the Emotions in Man and Animals, published in 1871, in which he wrote: "The young and the old of widely different races, both with man and animals, express the same state of mind by the same movements."

Recent work supports Darwin's theory that smiles, grimaces and more nuanced expressions are hardwired - an artifact of living in social groups. For example, studies show that infants, including those who are blind or have underdeveloped brains, use facial cues to tell their parents how they feel. Infants communicate with their faces even before they are old enough to understand the meaning of their own expressions. Because humans depend on one another for survival, we must communicate; facial expressions may have evolved as efficient ways to telegraph feelings and intentions.

Although using facial expressions to convey emotions may be largely instinctive, there is also a learned component. Japanese women and men, for instance, are taught to mask overt displays of emotion in favor of a socially acceptable smile.

By studying faces, researchers have matched subtle changes in the positioning of the mouth, eyes and eyebrows to variations in six basic human emotions - happiness, surprise, disgust, sadness, anger and fear. Scientists are using this information to develop computer technology that analyzes facial movements and tics to help assess the veracity of suspects' testimony.

Facial expressions do not just give us away; they may also allow us to experience our own emotions more fully. This process is still not well understood, but it is possible that forcing your face to express happiness, sadness or anger may help you feel those emotions. In addition, new research using MRI reveals that facial expressions not only reflect what people are feeling, they influence it, too. Studies have shown, for example, that when people make an angry face, they exhibit less activity in regions of the cerebral cortex associated with empathy and decision making.

http://www.bbc.co.uk/news/health-11711243

Painkillers 'risky in pregnancy'

By Michelle Roberts Health reporter, BBC News

Prolonged use of paracetamol and other painkillers during pregnancy may pose a health risk to baby boys, warn experts.

Danish research suggests the drugs raise the risk of undescended testicles in male babies, a condition linked to infertility and cancer in later life.

Doctors already advise pregnant women to avoid taking painkillers if possible to protect their unborn child.

Experts said the Human Reproduction journal findings warranted further research "as a matter of priority". But they reassured women that taking the occasional painkiller for a headache should not cause any harm. Current advice from the NHS is that women should avoid taking medicines while pregnant but that paracetamol is considered safe if used in small doses for short-term pain relief. Yet more than half of pregnant women in Europe and the US report taking mild painkillers.

Painkillers in pregnancy
Ideally avoid all medications when pregnant
Paracetamol seen as "safe" in small doses for short periods of use
Experts currently say ibuprofen may be used sparingly during the second trimester to ease pain and inflammation

In this latest investigation, researchers from Denmark, Finland and France studied more than 2,000 pregnant women and their babies.

They found those women who used more than one painkiller simultaneously, such as paracetamol and ibuprofen, had a seven-fold increased risk of giving birth to sons with some form of undescended testes, or cryptorchidism, compared to women who took nothing.

The second trimester - 14 to 27 weeks of pregnancy - appeared to be a particularly sensitive time.

Increased risk

Any analgesic use at this point in the pregnancy was linked to more than double the risk of cryptorchidism. Of the individual painkillers, ibuprofen and aspirin use were linked with a quadrupled risk. Paracetamol alone also appeared to raise the risk, although this result was not statistically significant. Simultaneous use of more than one painkiller, including paracetamol, during the second trimester increased the risk 16-fold.

Taking painkillers for more than two weeks at a time also appeared to raise the risk significantly.

The researchers suspect that painkillers upset the natural balance of male hormones at work in unborn baby boys and this hinders normal development. Studies of rats back this theory.

Dr Henrik Leffers, senior scientist at Rigshospitalet in Copenhagen, who led the research, said: "If exposure to endocrine disruptors is the mechanism behind the increasing reproductive problems among young men in the Western world, this research suggests that particular attention should be paid to the use of mild analgesics during pregnancy, as this could be a major reason for the problems."

Despite some limitations in the study - not all of the women may have accurately recalled how often they took painkillers, for example - the researchers say their findings suggest that advice to pregnant women on analgesic use should be reconsidered.

They called for more research into the link.

Dr Allan Pacey, senior lecturer in andrology at the University of Sheffield, said: "Scientists have been concerned for some time about chemicals that the mother may be exposed to during pregnancy having the potential to cause reproductive problems in male babies.

"However, there are relatively few concrete examples and much of the work to date has been theoretical. "That makes these studies somewhat alarming as I doubt that anyone would have suspected that common painkillers would have these effects.

"Clearly further research is needed as a matter of priority."

Dr Basky Thilaganathan of the Royal College of Obstetricians and Gynaecologists said the findings needed to be interpreted with caution. For example, he explained: "The study shows an association rather than causation; it is entirely possible that mothers took these analgesics for an ailment, for example, a viral infection, in pregnancy that may have been the real cause for the noted problems."

Cryptorchidism affects about one in 20 boys in the UK.

Analysis

Fergus Walsh Medical correspondent, BBC News

This large study, while interesting is not without limitations.

Of the individual painkillers, ibuprofen and aspirin approximately quadrupled the risk of cryptorchidism. Paracetamol doubled the risk, but the was not statistically significant. This suggests that a link between paracetamol use in pregnancy and male fertility problems is not clear-cut.

Pregnant women who are alarmed by these studies should note:

It is only prolonged use that has an effect, and most women in this study who used paracetamol

did not have a baby boy with cryptorchidism.

http://www.npr.org/templates/story/story.php?storyId=131064823

Humans' Big Brains Tied To Chimps' Immunity?

by Joe Palca Listen to the Story

It's a provocative - even astonishing - hypothesis: Could the same set of genes that explains why chimpanzees are protected from some diseases also explain why humans have big brains?

That's what researchers at Stanford University are suggesting.

The genes in question control a type of white blood cell known as natural killer cells, or NK cells.

"They can make a big difference as to whether you get sick, or you don't get sick," says Peter Parham, a professor of cell biology at Stanford. Parham has been studying the genes that control NK cells. And it's not a simple picture - there are a lot of genes involved.

Humans aren't the only primate with NK cells. Chimpanzees have them as well. But Parham realized that there must be some key differences between the ways NK cells in chimps and humans behave.

"There are a number of fairly major infections that infect humans but don't infect chimpanzees," he says. "HIV is one, malaria seems to be another."

Not only do natural killer cells play an important role in preventing disease, they also play a role in controlling blood flow between a mother and her developing fetus. As a pregnancy progresses, blood flow becomes more critical.

"As the baby gets bigger, its demand for blood goes up," says Parham.

That's crucial to keeping that big brain of ours growing in the womb.

Trading A Big Brain For Immunity?

But there seems to be a trade-off. The kind of NK cells that are good for getting lots of blood to the developing fetus are not as good for dealing with infection, and vice versa. As he reports in the journal, PLoS Genetics, Parham looked closely at the kinds of NK cells most common in humans, and compared them with the NK cells most common among chimpanzees.

"[T]he chimpanzee system seems to be much more optimized for dealing with infection," Parham says.

The human system, on the other hand, seems to be optimized for getting lots of blood to the developing fetus so our big brains can grow the way they're supposed to. That may have something to do with why we consider ourselves smarter than chimps.

Mary Carrington, a senior investigator at the National Cancer Institute, also studies the genes that control NK cells. She says it's not so surprising that chimpanzees need a more powerful immune system for fighting diseases than humans do.

"Humans have been cleaning up all the time, for a very long time, by building shelter, cooking food and doing other things like that," says Carrington. "And that's decreased our exposure to infections pathogens."

But Carrington thinks Parham's suggestion that there's a trade-off between a potent immune system and a big brain is a bit of a stretch. She says it's based on data from chimps that "we don't necessarily have a really good handle on." But, she says, "it's certainly provocative."

http://www.scientificamerican.com/blog/post.cfm?id=margaret-meads-war-theory-kicks-but-2010-11-08

Margaret Mead's war theory kicks butt of neo-Darwinian and Malthusian models

By John Horgan Monday, November 8, 2010 27

Why war? Darwinian explanations, such as the popular "demonic males" theory of Harvard anthropologist Richard Wrangham, are clearly insufficient. They can't explain why war emerged relatively recently in human prehistory - less than 15,000 years ago, according to the archaeological record - or why since then it has erupted only in certain times and places.

Many scholars solve this problem by combining Darwin with gloomy old Thomas Malthus. "No matter where we happen to live on Earth, we eventually outstrip the environment," the Harvard archaeologist Steven LeBlanc asserts in Constant Battles: Why We Fight (Saint Martin's Griffin, 2004). "This has always led to competition as a means of survival, and warfare has been the inevitable consequence of our ecological-demographic propensities." Note the words "always" and "inevitable."

LeBlanc is as wrong as Wrangham. Analyses of more than 300 societies in the Human Relations Area Files, an ethnographic database at Yale University, have turned up no clear-cut correlations between warfare and chronic resource scarcity. Similarly, the anthropologist Lawrence Keeley notes in War before Civilization: The Myth of the Peaceful Savage (Oxford University Press, 1997) that the correlation between population pressure and warfare "is either very complex or very weak or both."

Two tribal societies - the Semai of Malaysia and the Waorani of the Ecuadorian Amazon - represent especially striking exceptions to the Malthusian model. According to the anthropologists Clayton and Carole Robarchek (pdf), who lived among both societies, the Semai population is 60 times denser than the Waorani, and they have much less food, because their soil less fertile and game less plentiful. And yet the Semai, the Robarcheks pointed out, "are among the most peaceful people" known to anthropology (even though some Semai helped British colonialists fight communist insurgents in the 1950s). The Waorani, however, are one of the most violent known societies, with casualties from warfare claiming as much as 60 percent of the population.

War is both underdetermined and overdetermined. That is, many conditions are sufficient for war to occur, but none are necessary. Some societies remain peaceful even when significant risk factors are present, such as high population density, resource scarcity, and economic and ethnic divisions between people. Conversely, other societies fight in the absence of these conditions. What theory can account for this complex pattern of social behavior?

The best answer I've found comes from Margaret Mead, who as I mentioned in a recent post is often disparaged by genophilic researchers such as Wrangham. Mead proposed her theory of war in her 1940 essay "Warfare Is Only an Invention - Not a Biological Necessity." She dismissed the notion that war is the inevitable consequence of our "basic, competitive, aggressive, warring human nature." This theory is contradicted, she noted, by the simple fact that not all societies wage war. War has never been observed among a Himalayan people called the Lepchas or among the Eskimos. In fact, neither of these groups, when questioned by early ethnographers, was even aware of the concept of war.

In discussing the Eskimos Mead distinguished between individual and group violence. Eskimos were "not a mild and meek people," she noted. They engaged in "fights, theft of wives, murder, cannibalism," often provoked by fear of starvation. "The personality necessary for war, the circumstances necessary to goad men to desperation are present, but there is no war."

Mead next addressed the claim that war springs from "the development of the state, the struggle for land and natural resources of class societies springing, not from the nature of man, but from the nature of history." Here Mead seems to invoke Marx as well as Malthus. Just as the biological theory is contradicted by simple societies that don't fight, Mead wrote, so the theory of "sociological inevitability" is contradicted by simple societies that

do fight. Hunter–gatherers on the Andaman Islands "represent an exceedingly low level of society," but they have been observed waging wars, in which "tiny army met tiny army in open battle."

Australian aborigines, similarly, occasionally interrupted their wanderings "from water hole to water hole over their almost desert country" to battle each other. They seemed to fight not for any of the usual reasons - the "the struggle for lands, struggle for power of one group over another, expansion of population" - but because war was part of their tradition.

Warfare is "an invention," Mead concluded, like cooking, marriage, writing, burial of the dead or trial by jury. Once a society becomes exposed to the "idea" of war, it "will sometimes go to war" under certain circumstances. Some people, Mead stated, such as the Pueblo Indians, fight reluctantly to defend themselves against aggressors; others, such as the Plains Indians, sally forth with enthusiasm, because they have elevated martial skills to the highest of manly virtues; fighting bravely is the best way for a young man to achieve prestige and "win his sweetheart's smile of approval."

The original motivations for war's invention may have been those mentioned by Mead: conflicts between different groups over food, fertile land, women and status, perhaps driven by overpopulation. But the question remains why war spread so rapidly around the world after its initial invention. After all, unlike inventions such as cooking, agriculture and writing, which have obvious benefits, war is an extremely risky enterprise.

Mead did not directly address this question, but her successors have. The Robarcheks pointed out that war is in a sense "contagious," because when one group in a region resorts to war, "others must either take it up or be destroyed." Keeley, similarly, noted that war among North American Indians often stemmed from the aggression of just a few extremely warlike tribes, "rotten apples that spoiled their regional barrels." He added, "Less aggressive societies, stimulated by more warlike groups in their vicinity, become more bellicose themselves."

Societies in a violent region, the political scientist Azar Gat emphasized in War in Human Civilization (Oxford University Press, 2006[HARDCOVER]), have a strong incentive to carry out preemptive attacks. Societies may "attack the other side in order to eliminate or severely weaken them as a potential enemy. Indeed, this option only makes the other side more insecure, rendering the security dilemma more acute. War can thus become a self-fulfilling prophecy. The fear of war breeds war."

War, in other words, is a self-perpetuating meme. So how can we end it? Contrary to the claims of her critics, Mead was far from a naive optimist. In "Warfare Is Only an Invention" she asked, "If we know that it is not inevitable, that it is due to historical accident that warfare is one of the ways in which we think of behaving, are we given any hope by that?" Not necessarily, because "once an invention is known and accepted, men do not easily relinquish it." Writing at the dawn of World War II, Mead had good reason to fear that militarism had become too deeply embedded in modern culture to eradicate. "The deeds of our warriors are immortalized in the words of our poets; the toys of our children are modeled upon the weapons of war," she wrote.

For an invention to become obsolete, Mead argued, "people must recognize the defects of the old invention, and someone must make a new one." In this way trial by jury supplanted trial by ordeal or combat, which had come to seem "unfair, capricious, alien." She added that "to invent new forms of behavior which will make war obsolete, it is a first requirement to believe that such an invention is possible."

Only on this point do I disagree with Mead. We already have inventions - notably the United Nations - for resolving conflicts peacefully. We just need to use them instead of resorting to the worst invention of all time: war.

http://www.newscientist.com/article/dn19696-cannabis-compounds-make-females-more-masculine.html

Cannabis compounds make females more masculine

* 20:00 08 November 2010 by **Miriam Frankel**

When newborn female rats are given a substance mimicking cannabis, their brains become more masculine – as does their behaviour.

Margaret McCarthy from the University of Maryland in Baltimore and colleagues found that newborn female rats usually make more new cells than males in a part of their brain called the amygdala, an area that governs social and emotional behaviour.

They also found that females had a smaller endocannabinoid system, involving brain receptors that react to cannabis. That correlation made them wonder whether injecting substances that mimicked cannabis would alter the rate of cell proliferation in the amygdala. To find out, the team injected newborn rats with a compound that triggers cannabinoid receptors in the brain. They also injected a chemical that allowed them to see cell division in brain tissue. To find out how these changes affected rats' behaviour, the team also studied the playing habits of the pups after four weeks.

Without treatment, female rats produced between 30 and 50 per cent more glial cells – which help maintain homeostasis and protect neurons – in the amygdala than males. They also played 30 to 40 per cent less than males. But females that were given cannabinoid compounds had cell proliferation rates and play behaviour similar to those of males.

"Play behaviour is similarly sex-specific in humans," says McCarthy. "The ultimate goal is now to find out whether the neurological underpinnings of this behaviour, which we are beginning to understand in this study, are similar in humans".

Javier Fernández Ruiz from the Complutense University in Madrid, Spain, says the study is well-designed and convincing. But he emphasises that what it describes is a physiological process in the brains of rats, and that since the study did not use a plant-derived cannabinoid, or higher doses to reflect the fact that mouse metabolism is quicker than humans, no conclusions can be made about the effects of conventional cannabis on human babies.

Journal reference: Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.1005003107

http://www.physorg.com/news/2010-11-discovery-reveal-secrets-ancient-martian.html

Discovery could reveal secrets of ancient Martian and terrestrial atmospheres

Chemists at UC San Diego have uncovered a new chemical reaction on tiny particulates in the atmosphere that could allow scientists to gain a glimpse from ancient rocks of what the atmospheres of the Earth and Mars were like hundreds of millions years ago.

Their discovery also provides a simple chemical explanation for the unusual carbonate inclusions found in a meteorite from Mars that was once thought by some scientists to be evidence of ancient Martian life.

"We never knew before how the atmosphere could be trapped in carbonate," said Mark Thiemens, dean of UC San Diego's Division of Physical Sciences who headed the team of scientists that detailed its discovery in this week's early online edition of the Journal of the Proceedings of the National Academy of Sciences. "This chemical reaction, which takes place on the surface of aerosols in the atmosphere, not only provides us with an understanding of how these carbonates can form on the Earth and Mars. It gives us a new tool to better understand climate change, as our planet warms and becomes more dusty."

Robina Shaheen, a postdoctoral researcher in Thiemens' laboratory, discovered the chemical reaction and detailed its importance in the Earth's atmosphere after four years of painstaking experiments in which she found a higher than expected proportion of oxygen 17 isotopes in the carbonates found on dust grains, aerosols and dirt from various parts of the world.

Martian meteorites, such as ALH84001, which was once thought to exhibit evidence of extraterrestrial life, have carbonates with similarly high oxygen 17 anomalies. Scientists have long attributed those anomalies to photochemical processes involving ozone and carbon dioxide in the thin atmosphere on Mars, which is bathed by intense ultraviolet radiation. But after finding similar anomalies on terrestrial carbonates formed in atmospheric aerosols, Shaheen surmised they might be the result of another chemical process more common to both planets.

She analyzed in painstaking detail in the laboratory and in the Earth's atmosphere how ozone molecules interacted with oxygen-bearing mineral aerosols from dust, sea spray and other sources to form hydrogen peroxide and carbonates containing this same oxygen-isotope anomaly.

"What she found is that the tiny little layer on the outside of the grain is where this chemistry all happens," said Thiemens. "It's the ozone in the atmosphere mixing with water and carbon dioxide that drives a completely different kind of chemistry, one that's not in any of the models."

While current models of atmospheric processes assume that the mixing of large volumes of gases drives the chemistry of the Earth's atmosphere, the UCSD chemists think their discovery may force a rethinking of this idea, particularly as the Earth's atmosphere becomes warmer and more dusty, providing more opportunities for this sort of chemistry to take place on aerosols.

"You can do chemistry on a grain that's a lot quicker and easier in many respects than is possible in other atmospheric processes," said Thiemens.

Shaheen, who analyzed the carbonates in the Martian meteorite ALH84001 and found that they could have been formed on aerosols in ancient Martian atmosphere, said that NASA's Phoenix lander recently detected carbonates associated with particulates in the dusty atmosphere of Mars. "We think it might be this same mechanism that is operating," she added.

Besides understanding current and future atmospheric processes on the Earth and Mars, the new discovery offers the possibility of mining information about the Earth's atmosphere, particularly its oxygen levels, from carbonates found in ancient rocks millions of years ago, far beyond the time period from which scientists can

now obtain information about the ancient atmosphere from ice cores. The development of this new tool to probe ancient atmospheres could be the most significant aspect of the UCSD chemists' discovery.

"We've found a new way to measure the earth's atmosphere for time periods when we previously could not do it," said Thiemens. "What happened to ozone and oxygen levels 65 million years ago during the Cretaceous-Tertiary period when the dinosaurs and many other forms of life were killed in a mass extinction? Who died first? Did the food chain disappear before the dinosaurs? What happened 251 million years ago during the Permian-Triassic period, the most severe extinction of life on Earth, when 85 percent of life disappeared and no one knows why? There's no record of what happened in the atmosphere. But if you can find a record of what happened to oxygen levels, you can answer questions like that." *Provided by University of California - San Diego*

http://news.discovery.com/human/brains-neanderthals-humans.html

Human, Neanderthal Brains the Same Until Birth

The first year of life sparked dramatic differences in development that may have given humans an edge.

The brains of Neanderthals and humans were similar at birth but developed differently in the first year of life, according to a German study published Monday in the United States.

Brains of newborn human babies and Neanderthals, who became extinct about 28,000 years ago, were about the same size and appear almost identical at first, said the research which appeared in the journal Current Biology.

But after birth and particularly during the first year of life the differences in development are stark, said lead author Phillipp Gunz of the Max Planck Institute for Evolutionary Anthropology in Germany.

"There was a huge difference in the way they grew their brain compared to modern humans in the first one-and-a-half and two years," Gunz told AFP.

To compare the two brains, scientists assembled a virtual Neanderthal brain by scanning skull fragments and comparing the computer models at different stages of growth to the human baby brain.

The human brain began much more activity in neural circuitry in the first year of life, which may have helped early Homo sapiens survive in the process of natural selection, the study said.

"The interesting thing is within modern humans, the size of the brain correlates only very weakly with any measure of intelligence," he said. "It's more the internal structure of the brain that is important. And the Neanderthal, they were smart because they had a huge brain," he added, "but we think that internal structures must have been different because they grew differently, so we don't think the Neanderthal saw the world as we do."

Neanderthals are believed to be modern humans' closest ancestor, and some scientists view both as the same species. In May a landmark genome analysis determined that humans most likely interbred with Neanderthals, and that as much as four percent of the modern human genome seems to be from Neanderthals.

http://news.nationalgeographic.com/news/2010/11/101108-cities-immune-system-tuberculosis-tb-evolution-dna-genetics-science/

Early Cities Spurred Evolution of Immune System?

"Amazing" DNA results show benefits of ancient urbanization, study says.

Matt Kaplan for National Geographic News

As in cities today, the earliest towns helped expose their inhabitants to inordinate opportunities for infection - and today their descendants are stronger for it, a new study says.

"If cities increase the amount of disease people are exposed to, shouldn't they also, over time, make them natural places for disease resistance to evolve?" asked study co-author Mark Thomas, a biologist at University College London.

It's basic evolutionary theory: People who survive infection stand a better chance of having children and passing along disease-resistant genes. So groups from regions where urbanization has existed for thousands of years should be more disease resistant. The trick was finding proof.

To do so, study co-author Ian Barnes, a molecular paleobiologist at University College London, screened DNA samples from 17 groups long associated with particular regions of Europe, Asia, and Africa - for example Anatolian Turks and the southern Sudanese.

Barnes analyzed the DNA samples for a gene associated with resistance to tuberculosis (TB) and suspected of being associated with resistance to leprosy as well as to leishmaniasis, a reaction to sand fly bites, and to Kawasaki disease, a childhood ailment that involves inflamed blood vessels and can lead to heart disease.

At the same time, the team studied archaeological and historical data to work out where the earliest cities were on these regions. For example, in Anatolia the Çatal Hüyük settlement is roughly 8,000 years old, while in southern Sudan, the city of Juba (map) isn't even a hundred.

In areas of ancient urbanization, it turned out, "we found very high frequency" for the TB-resistance gene, study co-author Thomas said. But, for example, "the Saami people from northern Scandinavia and the Malawi people from Africa, who have little history of urban living, did not have this frequency.

"We were utterly amazed by how strongly the statistics supported what we were seeing," he added. "When you look for things like this in evolutionary history, there's so much over the years that can mess up your data."

The Price of Protection

"It's a good study and the findings make a lot of sense," said epidemiologist Andrew Read. But it also raises more questions. That it took the rise of disease-ridden cities to cause this resistant gene to become common suggests to me that there must be a cost to having it - or else it would have been common in the first place," said Read, of Pennsylvania State University, who wasn't involved in the new study.

Perhaps, he said, the resistant gene causes immune systems to overreact - and attack the body when it's exposed to harmless things like peanuts and pollen - making people more vulnerable to allergies and arthritis, for example. And while it may be small consolation to the allergic and arthritic, having those disorders, Read said, might be a small price to pay for avoiding death by tuberculosis.

http://www.physorg.com/news/2010-11-aggressive-statins-cardio.html

Aggressive use of statins further cuts cardio risk: study

Higher doses of statins cut the risk of heart attacks and stroke by one-seventh compared with regular statin treatment, according to a review published online on Tuesday by The Lancet.

The study looked at five trials in which around 40,000 patients, advised to lower their levels of blood cholesterol, received either regular statin treatment or intensive treatment. At the one-year point, intensive statins produced a "highly significant" additional reduction of 15 percent in cases of heart attack, coronary bypass and stroke compared with regular doses. The analysis found no increase in cancer or mortality from non-cardiovascular disease.

The research was carried out by the Cholesterol Treatment Trialists' Collaboration, led by Colin Baigent, an Oxford University professor. Statins, the biggest-selling prescription drugs in the world, work by reducing blood levels of artery-clogging "bad" cholesterol.

In a second study, also carried by The Lancet, British scientists found that, among high-risk patients, higher doses of statins reduced the risk of cardiac arrest, blockage or stroke by six percent compared to lower doses.

There was no difference in cardiovascular fatalities.

The trial was conducted among 12,000 men and women who had previously had a heart attack. They received either 80 milligrams or 20 mg of simvastatin daily.

http://www.physorg.com/news/2010-11-hour-treatment-outcomes.html

Improvements within 1 hour of stroke treatment associated with better outcomes

Patients with stroke who experience improvement within one hour of receiving the clot-dissolving medication tissue plasminogen activator appear more likely to do well three months later, according to a report in the November issue of Archives of Neurology.

Only one effective therapy has been approved for acute ischemic stroke (in which blood flow to an area of the brain is blocked or reduced), according to background information in the article. Within 4.5 hours of developing symptoms, patients receive an intravenous (IV) dose of the medication recombinant tissue plasminogen activator, which helps to break up clots in the blood vessels. "However, not all patients respond to IV therapy; failure to respond to IV therapy is usually, but not always, associated with occlusion of large arteries and lack of recanalization [the formation of new blood vessel paths around the obstruction]," the authors write. "Additional IV thrombolysis [clot-dissolving] therapies, such as chemical and/or mechanical intra-arterial therapy, represent a promising approach to obtaining recanalization and better recovery."

Ioan-Paul Muresan, M.D., and colleagues at Assistance Publique - Hopitaux de Paris, France, analyzed 120 patients with acute ischemic stroke who were treated with IV recombinant tissue plasminogen activator between Nov. 11, 2002, and Dec. 24, 2007. Individuals were classified as having very early neurologic improvement at one hour if they had a National Institute of Health Stroke Scale score of zero at the end of medication administration or if their score had improved five or more points (on a severity scale of zero to 30) compared with the beginning of therapy.

Of the 120 patients, 22 (18.3 percent) had very early neurologic improvement. After three months, 15 of these patients (68.2 percent) had a favorable outcome as assessed by a scale measuring disability following stroke, compared with 29 patients without early improvement (29.6 percent). None of the patients with very early improvement died, compared with 17.3 percent of other patients.

Asymptomatic brain bleeding occurred in two patients with early improvement (9.1 percent) and in 23 patients without early improvement (23.5 percent). Symptomatic brain bleeding occurred in five patients (4.2 percent), none of whom showed early improvement.

"A promising new approach in the treatment of acute ischemic stroke is bridging therapy with a dual approach: IV thrombolysis by recombinant tissue plasminogen activator followed by chemical or mechanical endovascular therapy," the authors write. "Our results suggest that very early neurologic improvement, as determined by a clinical routine tool (National Institutes of Health Stroke Scale) at a patient's bedside, might help to rapidly select patients who will not respond to IV recombinant tissue plasminogen activator but who could be candidates for bridging therapy." *More information: Arch Neurol. 2010;67[11]:1323-1328.*

http://www.eurekalert.org/pub_releases/2010-11/aafc-vfe110110.php

Very few eligible young women opt to take HPV vaccine

PHILADELPHIA - Despite strong evidence of its effectiveness, few of the young women who are eligible for the human papillomavirus (HPV) vaccine take it, according to research presented at the Ninth Annual AACR Frontiers in Cancer Prevention Research Conference, held Nov. 7-10. What's more, many of the teens who begin treatment do not complete the recommended three-dose regimen.

"Only about one-third of young women who begin the three-dose series actually complete it; this means that large numbers of teenagers are unprotected or under-protected from strains of HPV that lead to cervical cancer," said J. Kathleen Tracy, Ph.D., assistant professor, epidemiology and public health, University of Maryland School of Medicine (UMSOM), Baltimore.

HPV is the most common sexually transmitted disease among adolescent girls in the United States. At any given time, 29.5 percent of sexually active 14- to 19-year-old teenagers are infected. Persistent infection with certain HPV types may lead to cervical cancer.

Tracy and colleagues gathered information from the University of Maryland Medical Center's (UMMC) clinical data repository on the 9,658 teenagers and young women who were eligible for HPV vaccination between August 2006 (when UMMC began offering the vaccine) and August 2010. In all 2,641 young women started HPV vaccination; 39.1 percent received a single dose, 30.1 percent received two doses and 30.78 percent completed the recommended three-dose regimen.

Two-thirds of the teenagers who initiated vaccination were black. Age was a factor in vaccine adherence; young women aged 18 and older were the least likely to take more than a single dose. Young black women and teens were less likely than white to complete the three-dose series.

From a public health perspective, these findings highlight several critical issues, Tracy said. Scientists and public health advocates must identify strategies for increasing vaccination initiation. For instance, practitioners may have to play a more active role in encouraging patients to complete the doses, she said. Parents can be valuable partners, encouraging vaccination and ensuring that their daughters complete all three doses. Finally, strategies are needed to increase completion among all young adult women.

Technology may be one answer. Tracy and her team are preparing to launch a clinical trial to determine whether text message reminders increase completion of the three-dose series.

http://www.eurekalert.org/pub_releases/2010-11/qmuo-rgh110510.php

Rogue gene hijacks stem cells to jumpstart human cancer

A gene thought to be responsible for initiating human cancer has been identified by researchers at Barts and The London School of Medicine and Dentistry. The study - published online today (9 November) in the journal Cancer Research - paves the way for developing early cancer diagnostic tests, and finding new treatments that prevent or stop the spread of cancer cells at an early stage.

Led by Dr Muy-Tek Teh of the Institute of Dentistry at Barts and The London School of Medicine and Dentistry researchers have shown that a gene called FOXM1 exploits the inherent self-renewal property of stem cells causing excessive cell proliferation. Using adult human stem cells isolated from mouth tissues the team demonstrated that normal stem cells engineered in the lab to express abnormal levels of FOXM1 gene, triggered excessive cell growth within a 3D tissue culture model system set up to mimic human tissue regeneration in the laboratory. The 3D tissue culture system allows scientists to perform research on manipulated human cells without provoking ethical issues associated with human or animal subjects.

Stem cells expressing normal levels of the FOXM1 gene did not cause excessive cell growth. The abnormal growth triggered by FOXM1 resulted in a condition called hyperplasia - an early hallmark of pre-cancer. This is thought to represent the very first step of a series of abnormal molecular events leading to cancer formation.

Dr Teh said: "Now we know that FOXM1 plays a key role in cancer initiation we aim to translate our basic findings into clinically useful molecular diagnostic tests to detect cancer growth at early stages. Furthermore,

understanding the origin of cancer initiation may unveil new research opportunities for finding effective anti-tumour drugs that stop or prevent cancer at its earliest incipient stage."

The study was co-funded by the Wellcome Trust VIP award, Medical Research Council PhD studentship, the Institute of Dentistry Barts and The London School of Medicine and Dentistry, Queen Mary, University of London and the Norwegian Research Council.

'Induction of Human Epithelial Stem/Progenitor Expansion by FOXM1' is published advanced online on 9 November 2010 in Cancer Research

http://www.eurekalert.org/pub_releases/2010-11/ru-rlm110910.php

Recommendation letters may be costing women jobs, promotions

Women described in social terms that hurt likelihood of being hired

A recommendation letter could be the chute in a woman's career ladder, according to ongoing research at Rice University. The comprehensive study shows that qualities mentioned in recommendation letters for women differ sharply from those for men, and those differences may be costing women jobs and promotions in academia and medicine.

Funded by the National Science Foundation, Rice University professors Michelle Hebl and Randi Martin and graduate student Juan Madera, now an assistant professor at the University of Houston, reviewed 624 letters of recommendation for 194 applicants for eight junior faculty positions at a U.S. university. They found that letter writers conformed to traditional gender schemas when describing candidates. Female candidates were described in more communal (social or emotive) terms and male candidates in more agentic (active or assertive) terms.

A further aspect of the study involved rating the strength of the letters, or the likelihood the candidate would be hired based on the letter. The research team removed names and personal pronouns from the letters and asked faculty members to evaluate them. The researchers controlled for such variables as the number of years candidates were in graduate school, the number of papers they had published, the number of publications on which they were the lead author, the number of honors they received, the number of years of postdoctoral education, the position applied for and the number of courses taught.

"We found that being communal is not valued in academia," said Martin, the Elma Schneider Professor of Psychology at Rice. "The more communal characteristics mentioned, the lower the evaluation of the candidate."

A follow-up study funded by the National Institutes of Health is under way and includes applicants for faculty and research positions at medical schools. In the new study, enough applicants and positions will be included so that the researchers can use the actual decisions of search committees to determine the influence of letters' communal and agentic terms in the hiring decisions.

Words in the communal category included adjectives such as affectionate, helpful, kind, sympathetic, nurturing, tactful and agreeable, and behaviors such as helping others, taking direction well and maintaining relationships. Agentic adjectives included words such as confident, aggressive, ambitious, dominant, forceful, independent, daring, outspoken and intellectual, and behaviors such as speaking assertively, influencing others and initiating tasks.

"Communal characteristics mediate the relationship between gender and hiring decisions in academia, which suggests that gender norm stereotypes can influence hireability ratings of applicants," Martin said.

The "pipeline shortage of women" in academia is a well-known and researched phenomenon, but this study is the first of its kind to examine the recommendation letter's role in contributing to the disparity and evaluate it using inferential statistics and objective measures. It's also the first study to show that gender differences in letters actually affect judgments of hireability.

"This research not only has important implications for women in academia but also for women in management and leadership roles," said Hebl, professor of psychology and management at Rice. "A large body of research suggests that communality is not perceived to be congruent with leadership and managerial jobs."

The research team also noted that letter writers included more doubt raisers when recommending women, using phrases such as "She might make an excellent leader" versus what they used for male candidates, "He is already an established leader."

"Subtle gender discrimination continues to be rampant," Hebl said. "And it's important to acknowledge this because you cannot remediate discrimination until you are first aware of it. Our and other research shows that even small differences - and in our study, the seemingly innocuous choice of words - can act to create disparity over time and experiences."

Martin, Hebl and Madera's study, "Gender and Letters of Recommendation for Academia: Agentic and Communal Differences," was published last year in the American Psychological Association's Journal of Applied Psychology. They are currently beginning data collection on their next study on recommendation letters for medical faculty positions.

http://www.physorg.com/news/2010-11-genetic-lung-cancer-prompts-smokers.html

New research shows genetic test for lung cancer risk prompts smokers to quit

New research shows a gene-based test for lung cancer risk assessment motivates smokers to quit or cut down, according to results of a clinical study presented today at the American Association of Cancer Research's Ninth Annual Conference on Frontiers in Cancer Prevention Research.

Six months after taking the Respiragene test to identify susceptibility for lung cancer risk, 32% of the randomly recruited smokers in the study had quit smoking altogether and a further 48% had reduced their intake of cigarettes. More than half of the smokers taking the risk test (63%) had used nicotine replacement products, the first line therapy recommended to help smokers quit. More than 90% of those who took the risk stratification test said they would recommend it to family and friends who smoked.

"The findings from this research support other studies showing gene-based risk testing of smokers leads to significantly reduced smoking rates," said Dr Robert Young, Associate Professor of Medicine and Molecular Genetics at Auckland University, who presented the study findings. "Current quit rates are pretty dismal. Given the number of lung cancer deaths each year, improving those quit rates must be a priority."

Only about 4% to 7% of people are able to quit smoking on any given attempt without medicines or other help, according to the American Cancer Society.

Lung cancer kills more than 440 Americans a day and more than 157,000 a year. In the United States, lung cancer accounts for nearly 30% of all smoking-related deaths. The single most important action a smoker can take to reduce their risk is to quit smoking. Although the link between smoking and lung cancer is well known - approximately 90% of lung cancers are diagnosed in current or former smokers - smoking rates remain static in many states in the US despite ongoing public health initiatives.

"We found the results of the study very reassuring," said Dr Young. "The high rate of interest in taking Respiragene shows that smokers want to learn more about their own risk level, and for the vast majority, it helped them take positive steps to quit. These findings exceeded our expectations, especially as the participants in the study were randomly selected, and not specifically seeking support to quit smoking at the time of the study."

Young said he hoped the test, which personalizes risk for smoking-related diseases, would help lower smoking rates in the same way that measuring an individual's cholesterol and taking appropriate preventive steps to cut risk had brought a significant reduction in mortality from heart disease.

About the research

The study identified current smokers from a clinical database and randomly recruited 55 who completed a baseline questionnaire exploring their smoking habits and recent attempts to quit; 46 accepted the offer to take the test. Participants provided a simple cheek swab for DNA analysis and gave information about their family history of lung cancer and any previous diagnosis of Chronic Obstructive Pulmonary Disease (COPD). A week later smokers who underwent testing returned to the clinic for the result. The test estimates risk of lung cancer as moderate, high or very high based on DNA testing and non-genetic factors. Two follow-up interviews took place two weeks and six months after taking the Respiragene test, examining attitudes to the test and changes in smoking behavior. More than half of the smokers taking the risk test opted to use nicotine replacement products. U.S. Department of Health guidelines for doctors recommend nicotine replacement to help smokers quit; studies consistently show that smokers are much more likely to stop smoking if they are motivated and use medication.

More information: *American Association of Cancer Research Ninth Annual "Frontiers in Cancer Prevention" Conference presentations by Dr Robert Young:*

"Gene-based test for lung cancer risk motivates smoking cessation in randomly selected smokers." (November 8, 2010)

"Gene-based lung cancer risk test (Respiragene) identifies high risk smokers for early detection of lung cancer." (November 9, 2010)

"Susceptibility loci for lung cancer - are COPD-related genes the missing link?" (November 9, 2010)

http://www.physorg.com/news/2010-11-cooling-benefit-children-cardiac.html

Cooling may benefit children after cardiac arrest

When the heart is stopped and restarted, the brain is often permanently damaged. Therapeutic hypothermia has been shown to mitigate these harmful effects and improve survival in adults. In the first large-scale study of its kind, physicians are evaluating the effectiveness of the technique in infants and children.

When the heart is stopped and restarted, the patient's life may be saved but the brain is often permanently damaged. Therapeutic hypothermia, a treatment in which the patient's body temperature is lowered and

maintained several degrees below normal for a period of time, has been shown to mitigate these harmful effects and improve survival in adults.

Now, in the first large-scale multicenter study of its kind, physician-scientists are evaluating the effectiveness of the technique in infants and children. Offered in the greater New York metropolitan area solely by Columbia University Medical Center researchers at NewYork-Presbyterian/Morgan Stanley Children's Hospital, the Therapeutic Hypothermia After Pediatric Cardiac Arrest (THAPCA) trial is funded by the National Heart, Lung and Blood Institute, part of the National Institutes of Health.

"A tragedy no matter how it happens, cardiac arrest can occur in children either as a complication from a serious medical condition or due to an accident or sudden illness. While arrest in children is rare, currently no other therapies have been shown to improve their chances of recovering," says Dr. Charles Schleien, a pediatrician and anesthesiologist at NewYork-Presbyterian/Morgan Stanley Children's Hospital and executive vice chairman of pediatrics and professor of pediatrics and anesthesiology at Columbia University College of Physicians and Surgeons. "In this study we are aiming to see whether therapeutic hypothermia can give these children a better chance at survival and long-term quality of life."

According to a 2008 review of pediatric cardiopulmonary resuscitation in the journal Pediatrics, about 16,000 children suffer cardiac arrest each year in the United States.

Study participants will be randomly selected to either have their body cooled through therapeutic hypothermia or maintained at normal body temperature. In both groups, body heat will be adjusted using special temperature-control blankets. Those receiving hypothermia will have their body temperature reduced to between 89.6º and 93.2º Fahrenheit for two days, then slowly increased to a normal body temperature and maintained for another three days.

Co-led by Dr. Frank W. Moler at the University of Michigan C.S. Mott Children's Hospital and Dr. Michael Dean at the University of Utah, the six-year study involves a total of 34 study sites in North America.

http://www.physorg.com/news/2010-11-scottish-reveal-key-evolution-million.html

Scottish rocks reveal key point in evolution occurred 400 million years earlier

Evidence found in Scottish rocks has revealed that a critical point in evolution took place 1.2 billion years ago - several hundred million years earlier than scientists had previously understood.

The findings - published today in Nature - could lead to new understandings of when complex life - from which humans eventually emerged - evolved on Earth.

Until now scientists had believed an important shift in the levels of oxygen in the Earth's atmosphere took place 800 million years ago. This increase in oxygen marked the beginning of a move from simple organisms - which had inhabited the planet until this time - to the development of complex multi-cellular organisms which eventually led to life on Earth as we know it.

Chemical signatures of bacteria found in ancient rocks near Lochinver in the north-west Highlands of Scotland, has provided evidence that this key event in evolution actually took place some 400 million years earlier.

Professor in Geology at the University of Aberdeen, John Parnell led the study in collaboration with colleagues from the Scottish Universities Environmental Research Centre in Glasgow.

Field site at Stoer Bay, near Lochinver, Sutherlandshire

He said: "Our findings, which shift this key point in the evolution of life on Earth to a much earlier date than previously proven, will give impetus to further investigations into the timescale of the development of complex life, which followed this event.

"Our analysis of the chemical composition of rocks near Lochinver showed evidence that an important group of bacteria had existed within these rocks some 1.2 billion years ago.

"At this point in time the rocks would have been located at the bottom of a lake bed. Investigations revealed that these bacteria - which, on a basic level, use sulphur to obtain energy - were also using oxygen in a much more complex and efficient chemical reaction in order to generate their energy and survive.

"Evidence of this chemical reaction tells us that the levels of oxygen in the atmosphere were at this key point for evolution, at this much earlier stage in Earth's history."

Dr Adrian Boyce who runs a UK national analytical facility at the Scottish Universities Environmental Research Centre said: “Our geochemical analyses have provided a clear signal that levels of oxygen in the atmosphere had increased to levels critical to the evolution of complex life - from which we ourselves emerge - much earlier than has been previously proven to date. “This opens the door to a new understanding of the evolution of our planet’s atmosphere and the life it sustains.”

Professor Parnell added: “More in depth research would now need to be conducted in order to assess any potential knock- on effect our findings have for the timescale of the next stages of evolution, where life began to develop in more complex forms.” ***More information****: J Parnell et al, Nature, 2010, DOI: 10.1038/nature09538*

http://www.newscientist.com/article/dn19706-brain-gym-helps-elderly-drivers-avoid-crashes.html

Brain gym helps elderly drivers avoid crashes

*** 11:11 10 November 2010 by Andy Coghlan**

Elderly people who did 10 sessions of brain training had half as many crashes on the road as untrained counterparts – even though the training didn't directly relate to driving itself.

"There are no other cognitive training programs, or 'brain games', that have been demonstrated by published, peer-reviewed studies to enhance driving performance," says Jerri Edwards of the University of South Florida in Tampa, a co-leader of the study.

The results contradict a study of 11,000 people earlier this year, carried out by Adrian Owen at the University of Cambridge and colleagues, which found that brain training didn't help improve cognitive skills outside the game itself. "Overall, people need to know that not all brain training is equal," says Edwards. "Some programs work and some don't."

On the road

With an average age of 73, the 908 participants in the latest study were assigned to one of three different computer training programs or to no training at all. One program focused on improving reaction speed, another on reasoning skills and the third on memory. Each course lasted for 10 sessions, and then the participants were tracked for six years to see how many times they had road crashes for which they were personally responsible.

It turned out that the reaction speed and reasoning skills programs helped reduce accidents by 50 per cent, but the memory training made no difference. Of the participants with no training, 18 per cent had at least one crash, just slightly ahead of the 16 per cent of memory course participants who had accidents. By contrast, only 10 per cent of the speed-training group had crashes, and 12 per cent of those on the reasoning course.

Over the 10 sessions, the courses cranked up the skills of the participants by presenting them with progressively tougher tasks. In the reaction-speed program, for example, participants had to fulfil tests such as identifying targets flashing up on a computer screen. The reasoning course challenged participants to recognise patterns to solve problems.

"On the road, the brain needs to process a lot of visual information quickly," says Steven Aldrich, chief executive of Posit Science, the company in San Francisco, California, that developed the programs. "So the visual speed-of-processing training directly improves brain functions involved in driving safely, making them faster and more accurate."

Get to the gym

In the light of the findings, Edwards recommends that the elderly try cognitive training programs – but only ones that have been validated by research. Also, she says they should maintain physical exercise, as this helps to keep the brain fit too.

"Research shows that over long periods of time, participation in cognitively stimulating activities may stave off dementia," says Edwards. "However, engagement in effective and challenging brain exercises targeting specific cognitive abilities may be required to immediately improve cognitive and everyday function of older adults," she says.

Aldrich says that participating in the courses had other beneficial spin-offs. Trained brains were 38 per cent less likely to develop depression up to a year afterwards, and less likely than controls to develop health problems when checked two and five years after training. Also, 68 per cent of those who took the reaction-speed course retained their increased reaction times at a two-year follow up.

Torkel Klingberg, who develops cognitive training programs at the Karolinska Institute in Stockholm, Sweden, says the study shows that training in basic cognitive abilities can improve everyday performance too. "Both the reasoning training and the speed-of-reaction training would improve attention skills, which are both important in driving," he says.

Adrian Owen was contacted for comment but was unable to respond.

Journal reference: Journal of the American Geriatrics Society, DOI: 10.1111/j.1532-5415.2010.03138.x

http://www.newscientist.com/article/dn19711-calcium-causes-brain-cell-loss-in-parkinsons.html

Calcium causes brain cell loss in Parkinson's

*** 18:00 10 November 2010 by Catherine de Lange**

Calcium activity in the brain plays an important role in the onset of Parkinson's disease, according to a study in mice. The finding helps explain why common calcium-blocking drugs, such as those used to control blood pressure, appear to protect against the disease.

Damage to dopamine-releasing cells in a brain area called the substantia nigra (SN) is known to be involved in the onset of Parkinson's disease. "Pacemaking" cells in this area release pulses of dopamine, a hormone crucial for movement and balance. So damage to these cells leads to the symptoms of Parkinson's – such as tremors and stiffness.

A key question is why cells of the SN are so much more susceptible to damage than those in surrounding areas. Now it seems that calcium, which enters these cells to regulate their activity, is the culprit.

Jaime Guzman from Northwestern University in Chicago and colleagues compared the effect of calcium activity in two brain areas in mice – the pacemaking SN and a neighbouring area where there was no pacemaking activity.

Oxidative stress

They found that the calcium influx in the SN caused much higher levels of oxidative stress – pressure on cells to counteract the effects of molecules such as free radicals, that can damage proteins and DNA. Oxidative stress is thought to be the source of the cell damage that leads to Parkinson's disease.

"Although calcium channels normally participate in pacemaking, they aren't essential as other ion channels can pick up the slack," says James Surmeier, who was part of the team. Treating mice that had Parkinson's disease with calcium-channel-blocking drugs might therefore prevent cell damage without hindering essential pacemaking activity.

To investigate this possibility, the team used mice lacking a gene called DJ-1. The absence of this gene causes early onset Parkinson's disease, and mice who lacked the gene showed much higher levels of damage to the dopamine-releasing cells of the SN than normal mice. When treated with drugs that block calcium channels, however, the degree of cell damage dropped to levels seen in other types of brain cells that are relatively resistant to oxidative stress.

The right drug

The findings explain why previous research conducted by Christoph Meier at University Hospital Basel in Switzerland showed that calcium-blocking hypertension drugs reduced the risk of Parkinson's disease, while other types of drug used to treat high blood pressure did not. "A lot seems to point towards a potential benefit of calcium-channel blockers in Parkinson's disease," says Meier, "but it's too early to tell whether they help prevent the disease or could improve the situation of patients who already have a diagnosis."

Surmeier is more confident. "We think that anyone at risk of developing Parkinson's disease should benefit by the use of calcium blockers such as isradipine," he says, as it appears that the dopamine-producing cells in the SN begin to disappear well before the onset of symptoms.

Isradipine is already in a phase II clinical trial for people with early stage Parkinson's disease, and Surmeier is now planning to investigate more selective and potent drugs. *Journal reference: Nature, DOI: 10.1038/nature09536*

http://www.bbc.co.uk/news/health-11730068

Stem cell jab 'may boost muscle'

Muscle wasting linked to old age might one day be treated using stem cells, claim US scientists.

A University of Colorado team transplanted cells into mice and saw the muscle more than double in size - staying that way even into old age. They say their work, reported in Science Translational Medicine, may have promise in treating muscle-wasting conditions such as muscular dystrophy.

A UK expert said producing a human treatment might be difficult.

Stem cells are cells found in the body which can divide and become a variety of different types of tissue.

'Unexpected result'

Scientists believe they could potentially help treat a large number of problems by helping to re-populate areas of tissue damaged by disease or injury.

A common problem in older people is muscle weakness, linked to a loss of muscle mass in the arms and legs.

This can lead to a swift fall in the quality of life for older people and in some cases increase the need for extra care and support.

The reasons for the decline in muscle cell production later in life are not fully understood, but the Colorado research is testing the theory that muscle stem cells could help arrest or even reverse this.

They took young mice, created an "injury" in their limb muscles, then injected muscle stem cells from another mouse. Not only did the injury heal quickly, but the size of the muscle increased by an average of 170% - with a 50% increase in mass.

The surprising thing was that these gains did not evaporate over the next few months, as predicted by the researchers. As the mice approached two years old, their equivalent of human old age, the size of the muscles remained constant.

Professor Bradley Olwin, who led the research, said: "This was a very exciting and unexpected result.

"The hallmarks we see with the ageing of muscles just weren't occurring - the transplanted material seemed to kick the stem cells to a high gear for self-renewal, essentially taking over the production of muscle cells."

The "injury" created in the limb of the mouse appeared to be significant in this process - when cells were injected into uninjured muscle, there was no growth.

'Exciting'

Professor Olwin said that while the cells for these experiments were sourced from other mice, it might one day be possible to find a drug which could trigger a similar response from the patient's own stem cells.

He said this would open the door to treatment not just for old-age muscle loss, but also for diseases such as muscular dystrophy, in which irreversible muscle wasting starts early in life.

Dr Hans Degens, from the Institute for Human Movement and Health at Manchester Metropolitan University, said the research appeared to be "exciting", but that there were a number of obstacles which would need to be resolved before it could be considered in humans, including the need to control immune rejection when transplanting cells from a donor.

He said: "One of the worrying things for humans is the need for an injury to be simulated prior to treatment.

"In muscle wasting you would have to decide which muscles to treat, as the treatment would only affect a single muscle. It should also be noted that mouse muscles are considerably smaller than human muscles - you may have to make multiple injections."

http://www.eurekalert.org/pub_releases/2010-11/cp-alh111010.php

A long history of pain: Study finds pain gene common to flies, mice and humans

By using a sophisticated method to silence genes in fly neurons one by one, researchers reporting in the Nov. 12 issue of Cell, a Cell Press publication, have many new leads on the genes that are important to the experience of pain.

They show that one of those genes in particular has a long evolutionary history, as evidenced by the fact that it plays a role in pain sensing in flies, mice and humans. At least in mice, the newly described gene is also linked to a condition known in humans as synesthesia, in which one sensory experience triggers the perception of another sense.

"We found lots of new genes and pathways that have never been implicated in pain before," said Josef Penninger of the Institute of Molecular Biotechnology of the Austrian Academy of Sciences.

"From a helicopter view, this shows that there are evolutionarily conserved contributors to pain in flies, mice and humans," added Clifford Woolf of Harvard Medical School, a finding that underscores the importance of pain as a protective mechanism.

Detailed studies in mice show another intriguing feature of the pain gene; it acts in the brain, not in the peripheral nerves, as most known pain genes do.

In what the researchers say is the first genome-wide screen for a complex behavior in flies, thousands of fly genes were silenced using tiny bits of RNA in a method known as RNA interference. Those flies were then tested for their response to noxious heat. In this case, if the flies failed to move away from the heat, they would die. “We wanted to get as complete a list of genes as possible," Penninger said. "We were almost too successful." The exercise turned up hundreds of genes with a potentially important role in the insects' sense of heat-induced pain.

The research team then focused their attention on one of those genes in particular, known as a2d3 or straightjacket. That gene had no previously known role in pain but was of interest in part because it is related to another gene that is the target of existing analgesic drugs, they explained.

Much like the behavior observed in the flies, mice lacking activity of the gene took longer to jump off of a hot plate. Rare variants of a2d3 were also found in humans with reduced sensitivity to both heat and chronic back pain, they report.

But the researchers were in for another surprise. In the mice, they were able to trace where a2d3 was acting and they saw activity primarily in the brain, not in the nerve endings that are immediately responsible for sensing heat. "We had no idea what it might be doing," Woolf said.

Through functional MRI studies of the brains of sleeping mice as they were exposed to heat, the researchers found that the pain signal in mutants goes to the thalamus of the brain as it should. But that signal is then not sent on properly to higher order pain centers.

Rather, the signal goes instead to other sensory parts of the brain involved in smell, sight and hearing. "Of course, we cannot ask the mouse, but it appears they see, hear and smell the pain signal," Penninger said.

"Here, we found a [pain] gene in the fly that, in the mouse, led us to synesthesia. It was completely unexpected," Woolf said.

The discovery makes the mutant mouse the first model of synesthesia, a condition affecting some four percent of the human population. "There was a famous composer who said he could see his music because each note was a different color," Penninger said. "It's been difficult to study because there had been no model and no genes had been identified."

The researchers also now have hundreds of other pain-related genes that turned up in their initial screen left to explore. In a broad sense, the study shows the power of fly genetics, the researchers say.

"One can really model even complex behaviors like the experience of pain in organisms like the fly and come up with novel pathways that can be translated back to mice and humans," Penninger said. "It works quite well and we learn something entirely new."

But, Woolf added, "the greatest outcome is that we will use this knowledge to identify targets for new analgesics, not just to understand pain." Many of today's pain therapies are relatively ineffective or have severe side effects, he explained. Drug companies are working with perhaps 10 or 20 potential targets for new drugs. "Now, we have hundreds of potential targets, most of them completely novel."

The primary authors for this research are Clifford J. Wolf, Children's Hospital Boston and Department of Neurobiology, Harvard Medical School, and Josef M. Penninger, Institute of Molecular Biotechnology of the Austrian Academy of Sciences. In additional to Woolf and Penninger, this paper was co authored by: G. Gregory Neely, Andreas Hess, Michael Costigan, Alex C. Keene, Spyros Goulas, Michiel Langeslag, Robert S. Griffin, Inna Belfer, Feng Dai, Shad Smith, Luda Diatchenko, Vaijayanti Gupta, Cui-ping Xia, Sabina Amann, Silke Kreitz, Cornelia Heindl-Erdmann, Susanne Wolz, Cindy V. Ly, Suchir Arora, Rinku Sarangi, Debasis Dan, Maria Novatchkova, Mark Rosenzweig, Dustin Gibson, Darwin Truong, Daniel Schramek, Tamara Zoranovic, Shane J.F. Cronin, Belinda Angjeli1 Kay Brune, Georg Dietzl, William Maixner, Arabella Meixner, Winston Thomas, J. Andrew Pospisilik, Mattias Alenius, Michaela Kress, Sai Subramaniam, Paul A. Garrity and Hugo J. Bellen.

http://www.eurekalert.org/pub_releases/2010-11/wfub-aei111010.php

Arsenic early in treatment improves survival for leukemia patients

WINSTON-SALEM, N.C. – Thursday, Nov. 11, 2010 – Arsenic, a toxic compound with a reputation as a good tool for committing homicide, has a significant positive effect on the survival of patients with acute promyelocytic leukemia (APL), when administered after standard initial treatment, according to a new, multi-center study led by a researcher at Wake Forest University Baptist Medical Center.

While arsenic trioxide (As2O3) is known by clinicians to be a highly effective treatment for patients with relapsed APL, its benefit earlier in treatment, after first remission, has remained unknown…until now.

Researchers with the Cancer and Leukemia Group B, a group of cancer and leukemia researchers funded by the National Cancer Institute, led a study to determine if, by administering arsenic trioxide earlier – after a patient has finished standard initial treatment and reached first remission – they could improve survival rates. The results were dramatic.

"Patients with APL can achieve remission with standard treatment (chemotherapy plus ATRA, an oral vitamin A-based compound), but it often comes back," said Bayard L. Powell, M.D., a professor of hematology and oncology at Wake Forest Baptist, principal investigator and lead author on the study. "Arsenic trioxide is then used to get them back into remission, often followed by a bone marrow transplant to try to cure the patient. For this study, we used arsenic as an early "consolidation therapy" after the initial standard treatment to essentially, as one of our first patients described, 'seal the deal' the first time around. Not only did the leukemia rarely return in the patients who received the arsenic, those patients also lived longer."

The findings appear in the November 11 issue of Blood.

APL accounts for about 10 to 15 percent of acute myeloid leukemia cases and presents most frequently in young adults. It is associated with a very high risk of severe bleeding complications, including early death from bleeding into the brain.

Current treatment of APL involves a combination of all-trans retinoic acid (ATRA) plus chemotherapy to induce remission, followed by additional "consolidation" chemotherapy to strengthen the remission, followed by further ATRA with or without oral chemotherapy to maintain remission. This approach yields complete remission rates of about 90 percent and improved event-free survival, with an "event" defined as failure to achieve complete remission, relapse after achieving complete remission, or death.

Those with high white blood cell counts at diagnosis have a worse prognosis, however, with higher risk of early death during initial standard treatment. If they survive initial treatment and enter remission, they are also more prone to relapse, at which point arsenic is introduced to push them back into remission.

While arsenic can be toxic and is used in potent pesticides and poisons, it also exists naturally in the environment and, when manufactured under carefully-controlled conditions and used appropriately by doctors and nurses experienced in the treatment of cancer, can provide a significant health benefit.

Arsenic has been proven effective in pushing those unresponsive to initial treatment, and those who relapse after initial response, into remission. But researchers wanted to know what would happen if they used the arsenic trioxide after initial standard treatment, rather than wait until a patient relapses.

For the study, North American Leukemia Intergroup trial C9710, investigators randomized 481 patients with untreated APL, age 15 and older, into two groups. Both groups would receive standard treatment of ATRA plus chemotherapy, followed by standard consolidation therapy. One of the groups received an additional two 25-day courses of intravenous arsenic trioxide before administration of the standard consolidation therapy.

The patients in the investigational group received arsenic trioxide intravenously for one hour, five days a week, for five weeks, with a two-week break between courses.

After initial standard treatment, both groups experienced similar rates of remission, at about 90 percent, and there were no treatment-related deaths reported from either group during consolidation therapy, indicating that the addition of arsenic treatment earlier introduces no additional safety concerns.

Analysis of the overall results revealed that event-free survival, defined as the time from study entry to first event (defined above), was significantly better for patients randomized to receive the arsenic trioxide consolidation therapy, For example, after three years, event-free survival was 80 percent in the arsenic group versus 63 percent in the non-arsenic group. Arsenic trioxide consolidation provided significant benefit to patients in the investigational group regardless of their initial prognosis based on white blood cell count and other risk factors.

The group who received arsenic also faired better in relapse rates and overall survival, researchers found. Out of 196 study participants who received at least one dose of arsenic after initial standard treatment, only seven individuals – four percent – relapsed within three years of follow-up.

"We think people who received the arsenic trioxide after initial standard treatment are likely cured," Powell said. "There have been no relapses in that group after 36 months. The use of arsenic earlier in treatment improves the cure rate and survival, and it does so with little or no additional toxicity."

The results are exciting, Powell said. "It gives us hope that, with the addition of arsenic trioxide earlier in treatment, we may be able to eliminate some of the chemotherapy and reduce toxicities and costs."

However, 19 patients (eight percent) in each group died during the initial standard treatment, Powell pointed out, and those who were randomized to receive the arsenic never got a chance to benefit from it, since they didn't live through the initial treatment.

"One of our next objectives is to reduce or eliminate these early deaths – most common in patients with high white blood cell counts – possibly by introducing arsenic even earlier than we did this time, as part of initial induction therapy, to help them achieve remission," Powell said. "Some of these patients are at such high risk that they may need the arsenic just to get them into remission, so they have a chance."

Powell's co-authors in the North American Leukemia Intergroup study are Barry Moser, Ph.D., Wendy Stock, M.D., Richard M. Stone, M.D., and Richard A Larson, M.D., of Cancer and Leukemia Group B (CALGB), in Chicago, IL; Robert E. Gallagher, M.D., Jacob M. Rowe, M.D., and Martin S. Tallman, M.D., of the Eastern Cooperative Oncology Group (ECOG), in Brookline, MA; Cheryl L. Willman, M.D., Steven Coutre, M.D., and Frederick R. Appelbaum, M.D., of Southwest Oncology Group (SWOG), in San Antonio, TX; James H. Feusner, M.D., and John Gregory, M.D., of Children's Oncology Group (COG), in Arcadia, CA; and Stephen Couban, M.D., of the National Cancer Institute of Canada Clinical Trials Group (NCIC-CTG), in Kingston, ON, Canada.

http://www.eurekalert.org/pub_releases/2010-11/si-mai110410.php

Modeling autism in a dish

LA JOLLA, CA—A collaborative effort between researchers at the Salk Institute for Biological Studies and the University of California, San Diego, successfully used human induced pluripotent stem (iPS) cells derived from patients with Rett syndrome to replicate autism in the lab and study the molecular pathogenesis of the disease.

Their findings, published in the Nov. 12, 2010, issue of Cell, revealed disease-specific cellular defects, such as fewer functional connections between Rett neurons, and demonstrated that these symptoms are reversible, raising the hope that, one day, autism maybe turn into a treatable condition.

"Mental disease and particularly autism still carry the stigma of bad parenting," says lead author Alysson Muotri, Ph.D., an assistant professor in the Department of Molecular and Cellular Medicine at the University of

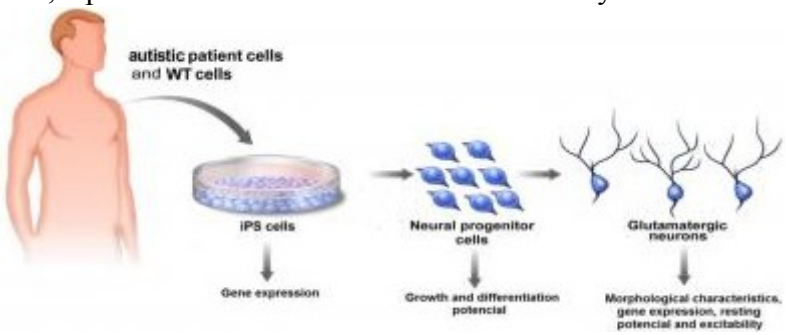
California, San Diego School of Medicine. "We show very clearly that autism is a biological disease that is caused by a developmental defect directly affecting brain cells."

Rett syndrome is the most physically disabling of the autism spectrum disorders. Primarily affecting girls, the symptoms of Rett syndrome often become apparent just after they have learned to walk and say a few words. Then, the seemingly normal development slows down and eventually the infants regress, loosing speech and motor skills, developing stereotypical movements and autistic characteristics.

Almost all cases of the disease are caused by a single mutation in the MeCP2 gene, which is involved in the regulation of global gene expression, leading to a host of symptoms that can vary widely in their severity.

"Rett syndrome is sometimes considered a 'Rosetta Stone' that can help us to understand other developmental neurological disorders since it shares genetic links with other conditions such as autism and schizophrenia," says first author Carol Marchetto, Ph.D., a postdoctoral researcher in the Laboratory of Genetics at the Salk Institute.

In the past, scientists had been limited to study the brains of people with autistic spectrum disorders via imaging technologies or postmortem brain tissues. Now, the ability to obtain iPS cells from patients' skin cells, which can be encouraged to develop into the cell type damaged by the disease gives scientists an unprecedented view of autism.

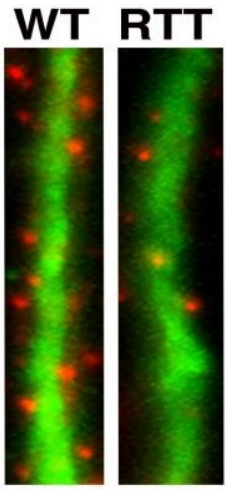


Human induced pluripotent stem (iPS) cells derived from patients with Rett syndrome allow researchers to replicate autism in the lab and study the molecular pathogenesis of the disease. **Illustration: Courtesy of Jamie Simon, Salk Institute for Biological Studies**

"It is quite amazing that we can recapitulate a psychiatric disease in a Petri Dish," says lead author Fred Gage, Ph.D., a professor in the Salk's Laboratory of Genetics and holder of the Vi and John Adler Chair for Research on Age-Related Neurodegenerative Diseases. "Being able to study Rett neurons in a dish allows us to identify subtle alterations in the functionality of the neuronal circuitry that we never had access to before."

Marchetto started with skin biopsies taken from four patients carrying four different mutations in the MeCP2 gene and a healthy control. By exposing the skin cells to four reprogramming factors, she turned back the clock, triggering the cells to look and act like embryonic stem cells. Known at this point as induced pluripotent stem cells, the Rett-derived cells were indistinguishable from their normal counterparts.

It was only after she had patiently coaxed the iPS cells to develop into fully functioning neurons—a process that can take up to several months—that she was able to discern differences between the two. Neurons carrying the MeCP2 mutations had smaller cell bodies, a reduced number of synapses and dendritic spines, specialized structures that enable cell-cell communication, as well as electrophysical defects, indicating that things start to go wrong early in development.



Since insulin-like growth factor 1 (IGF-1)—a hormone which, among other things, has a role in regulating cell growth and neuronal development—was able to reverse some of the symptoms of Rett syndrome in a mouse model of disease, the Salk researchers tested whether IGF-1 could restore proper function to human Rett neurons grown in culture.

"IGF-1 treatment increased the number of synapses and spines reverting the neuronal phenotype closer to normal," says Gage. "This suggests that the autistic phenotype is not permanent and could be, at least partially, reversible."

Neurons generated from Rett-iPS cells form fewer synapses, the specialized signal transmission points between brain cells. Synapses are shown in red and dendrites, which function as signal receivers, are shown in green. **Image: Courtesy of Dr. Carol Marchetto, Salk Institute for Biological Studies.**

Muotri is particularly excited about the prospect of finding a drug treatment for Rett syndrome and other forms of autism: "We now know that we can use disease-specific iPS cells to recreate mental disorders and start looking for new drugs based on measurable molecular defects."

Researchers who also contributed to the work include Cassiano Carromeu and Allan Acab in the Department of Pediatrics/Cellular & Molecular Medicine at the University of California, San Diego, Diana Yu and Yangling Mu in the Laboratory of Genetics at the Salk Institute for Biological Studies, Gene Yeo in the School of Medicine at the University of California, San Diego, as well as Gong Chen in the Department of Biology at the Pennsylvania State University.

This work was supported by the Emerald Foundation Young Investigator Award, the National Institutes of Health through the NIH Director's New Innovator Award Program, the California Institute for Regenerative Medicine, The Lookout Fund and the Picower Foundation.

http://www.physorg.com/news/2010-11-dont-clamp-umbilical-cords-straight.html

Don't clamp umbilical cords straight after birth, urges expert

Obstetricians and midwives should wait a few minutes before clamping the umbilical cords of newborn infants so that babies are not harmed by the procedure, argues Dr David Hutchon in an article published in the British Medical Journal today.

Hutchon, a retired consultant obstetrician from the Memorial Hospital in Darlington, says it's time for the UK to follow guidance from the World Health Organisation and the International Federation of Gynaecology and Obstetrics and refrain from early cord clamping. Despite evidence for the benefit of delayed cord clamping, clinicians in the UK seem reluctant to change their practice, he says, and the UK National Institute for Health and Clinical Excellence (NICE) is not advising them to do so.

One explanation for the apparent resistance of clinicians to follow the evidence is that that cord clamping "has become the accepted norm so much so that delaying clamping is generally considered a new or unproved intervention," he writes.

Yet he argues that "applying a clamp to the cord is clearly an intervention, having the greatest effect when it is done quickly after birth." And he fears that babies might be injured by very early clamping, for example they could experience severe blood loss (hypovolaemia). He adds that two popular pregnancy information books both imply that delayed cord clamping is the norm and explain the advantage to the baby of delayed clamping.

Hutchon believes that if the need for early cord clamping was removed from NICE's guideline, "there could be an overnight change in practice."

He concludes: "Clamping the functioning umbilical cord at birth is an unproven intervention. Lack of awareness of current evidence, pragmatism, and conflicting guidelines are all preventing change. To prevent further injury to babies we would be better to rush to change." *Provided by British Medical Journal*

http://www.physorg.com/news/2010-11-yoga-ability-mood-lessen-anxiety.html

Yoga's ability to improve mood and lessen anxiety is linked to increased levels of a critical brain chemical

Yoga has a greater positive effect on a person's mood and anxiety level than walking and other forms of exercise, which may be due to higher levels of the brain chemical GABA according to an article in The Journal of Alternative and Complementary Medicine, a peer-reviewed journal published by Mary Ann Liebert, Inc.

Yoga has been shown to increase the level of gamma-aminobutyric acid, or GABA, a chemical in the brain that helps to regulate nerve activity. GABA activity is reduced in people with mood and anxiety disorders, and drugs that increase GABA activity are commonly prescribed to improve mood and decrease anxiety.

Tying all of these observations together, the study by Chris Streeter, MD, from Boston University School of Medicine (Massachusetts) and colleagues demonstrates that increased GABA levels measured after a session of yoga postures are associated with improved mood and decreased anxiety. Their findings establish a new link between yoga, higher levels of GABA in the thalamus, and improvements in mood and anxiety based on psychological assessments. The authors suggest that the practice of yoga stimulates specific brain areas, thereby giving rise to changes in endogenous antidepressant neurotransmitters such as GABA.

"This is important work that establishes some objective bases for the effects that highly trained practitioners of yoga therapy throughout the world see on a daily basis. What is important now is that these findings are further investigated in long-term studies to establish just how sustainable such changes can be in the search for safe non-drug treatments for depression," says Kim A. Jobst, MA, DM, MRCP, MFHom, DipAc, Editor-in-Chief of The Journal of Alternative and Complementary Medicine.

More information: The article is available free online. Provided by Mary Ann Liebert, Inc.

http://www.scientificamerican.com/article.cfm?id=high-hopes-for-arthritis-drugs

High hopes for arthritis drugs

Race is on to develop treatments that inhibit signalling proteins.

By Heidi Ledford

A wave of encouraging clinical-trial data is raising hopes for a new class of drugs to treat rheumatoid arthritis. The therapies, hotly pursued by pharmaceutical companies, inhibit proteins called kinases, and aim to halt the inflammation that causes debilitating pain and eventual destruction of bone and cartilage.

Leading the pack is a compound called tasocitinib, made by the New York-based pharmaceutical giant Pfizer. Yesterday, at the annual American College of Rheumatology meeting in Atlanta, Ga., researchers announced the results of a double-blind, randomized trial in more than 600 patients: tasocitinib eased pain and inflammation in 65.7 percent of those who received the highest dose of the drug, whereas only 26.7 percent of those who received a placebo reported relief.

The company intends to complete additional trials of the compound by mid-2011, and to submit an application for approval to the Food and Drug Administration about six months later. Analysts at Jeffries International, an investment banking firm headquartered in New York, say that sales of tasocitinib could reach $6.5 billion a year.

Meanwhile, Incyte, a pharmaceutical company in Wilmington, Del., presented promising results from a smaller trial of its own kinase inhibitor. And a paper published in September by the New England Journal of Medicine reported that a kinase inhibitor made by Rigel Pharmaceuticals of South San Francisco, California, lessened symptoms in up to 67 percent of the patients who received the drug in a 457-patient study, compared to a 35 percent response in the placebo arm.

Taken together, the results suggest that people with rheumatoid arthritis may soon have new options for treatment, says Gary Firestein, a rheumatologist at the University of California, San Diego School of Medicine. "We've crossed the Rubicon with respect to kinase inhibitors," he says. "It's a very exciting time."

Transformative treatments

Such drugs could have a wide reach. About one person out of every hundred has rheumatoid arthritis, and the global market for drugs to treat the condition swelled from $1.3 billion in 1998 to $13 billion in 2009.

Therapies introduced in that time have revolutionized treatment, says William Robinson, a rheumatologist at Stanford University School of Medicine in California. Back in 1998, "there were many patients in the waiting room with deformities from their rheumatoid arthritis," he says. "Their hands were deviated over and twisted."

Disfigured hands are now rare. Yet low-level disease persists in many patients, and some still face debilitating pain, says Robinson.

Many existing drugs for rheumatoid arthritis are expensive protein therapies, such as the blockbuster antibody drug Remicade (infliximab), marketed in the United States by Centocor of Horsham, Penn., which earned about $6 billion in global sales in 2009. But for around a third of rheumatoid arthritis patients, these drugs either fail or produce intolerable side effects, says Paul Friedman, chief executive of Incyte.

In addition, protein drugs must be injected, and often persist in the body for a long time. That can be a drawback for patients experiencing unwanted side effects. "One of the claims to fame is that you only have to be injected once a month," says Friedman. "But if something goes wrong, you also can't get it out of your system for at least that month."

As a result, companies have pushed to develop drugs that could be taken orally. Initial results were discouraging: attempts to simply replace the protein therapies with small-molecule drugs that hit the same targets largely failed, says Saeed Fatenejad, a rheumatologist at Pfizer who is responsible for clinical development of tasocitinib. "There's been a lot of effort to do that," he says. "We've tried them ourselves and obviously we haven't been successful."

And several attempts to carve a new target from a family of enzymes called p38 kinases have also failed, despite favorable results in animal models. Kinases that work through different pathways, however, now seem to hold more potential.

A promising mechanism

Both tasocitinib and Incyte's drug, INCB028050, target Janus kinases, which mediate signaling by immune-system proteins called cytokines. Suppressing those signals could limit the autoimmunity that causes inflammation in rheumatoid arthritis patients. In December 2009, Incyte sold the commercialization rights to its compound to Eli Lilly, a drug-maker based in Indianapolis, Ind., for $750 million.

Tasocitinib is expected to make it to market, says Jeffrey Stoll, an analyst at IMS Health, a pharmaceutical market research company headquartered in Norwalk, Conn.. But the drug faces many hurdles. Early results show that it causes a drop in levels of certain white blood cells, increasing the possibility of infections, and raises cholesterol, a worrying side effect in a patient population that is already prone to cardiovascular disease. And none of these kinase inhibitors have yet been rigorously tested in a head-to-head comparison with the protein therapies already on the market.

Rigel's kinase inhibitor, called fostamatinib, targets spleen tyrosine kinase, which among other functions enables the formation of the large immune-cell complexes found in autoimmune diseases. In February, Rigel licensed its drug to AstraZeneca, a pharmaceutical company headquartered in London, for $100 million upfront, to be followed by up to $1.2 billion if the drug meets developmental milestones.

Overall, the results from oral kinase inhibitors are very exciting, says Robinson. But he adds that, as with any drug that suppresses autoimmunity, the risk that a diminished immune response could lead to infection remains a concern. Thus far, such side effects seen in clinical trials have been minor, but it sometimes takes years of exposure to a drug before deadly infections show up, he says.

Nevertheless, patients will ultimately benefit from a wide range of treatment options. Better understanding of the mechanisms driving rheumatoid arthritis in individual patients will ultimately fragment the disease into different subtypes, says Robinson. "There won't be a one-size-fits-all drug for rheumatoid arthritis," he says. "We'll need drugs targeting the mechanisms that drive arthritis in different subsets of patients."
http://www.newscientist.com/article/mg20827864.500-blood-bubbles-promise-new-treatments-for-brain-disease.html

Blood bubbles promise new treatments for brain disease

Bubbles in the blood can deliver drugs, make cells express certain genes and open up the blood-brain barrier, leading to new treatments for brain disease

*** 12 November 2010 by Jessica Hamzelou**

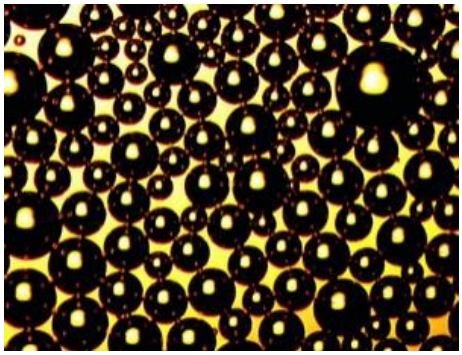


Image: Eleanor Stride

SCUBA divers are all too aware of the danger of bubbles of air forming in the blood. The bends can be lethal. But bubbles in the bloodstream are not always a bad thing. Much smaller bubbles can be used to deliver drugs, help prevent damage from stroke and even open up the blood-brain barrier, a discovery that could lead to new treatments for diseases of the brain.

A few decades ago, researchers discovered by chance that "microbubbles" of air in the blood made ultrasound images clearer and brighter. Now a group of researchers who call themselves "the bubble community" are finding new roles for these bubbles.

Ultrasound applied to microbubbles in the blood causes them to oscillate, which appears to boost the uptake of drugs and gene therapies into nearby cells, though how this works is unclear. "The theory is that the bubbles are stimulating natural uptake mechanisms," says Eleanor Stride at University College London. "Exactly which mechanisms, we're not sure."

Stride's team has enhanced this effect by adding magnetic nanoparticles to the microbubbles. The group injected mice with a solution containing a gene for bioluminescence, and a suspension of bubbles, before magnetically dragging the bubbles to one lung and applying ultrasound there.

Three days later, the team found bioluminescence only in the target lung, confirming that the gene hadn't been expressed elsewhere. The findings were presented at the Institute of Electrical and Electronics Engineers Ultrasonics Conference in San Diego, California, last month.

Even more surprising is the microbubbles' ability to open the blood-brain barrier - a blockade that stops large molecules, including many drugs, getting from the bloodstream into the brain. "If you expose the blood-brain barrier to bubbles and ultrasound, you can temporarily and reversibly enhance its permeability, which is potentially very interesting for a lot of brain treatments," says Stride.

Oscillating microbubbles could also be useful in stroke therapy. Christy Holland at the University of Cincinnati in Ohio and her colleagues have been developing different types of bubbles to treat stroke in rats. In their latest project, the group filled microbubbles with xenon - a gas known to protect brain cells from dying and improve blood flow, but difficult to administer. They found that rats treated with xenon-filled bubbles after a stroke had smaller areas of brain damage than untreated rats *(Circulation, DOI: 10.1161/circulationaha.109.879338).*

Other groups have started trialling microbubbles in people. Andrei Alexandrov at the University of Alabama in Birmingham and his team treated stroke patients within 3 hours of stroke onset with one of three doses of tissue plasminogen activator (tPA) - used to break down clots - with or without microbubbles and ultrasound.

Of those on the middle tPA dose with microbubbles and ultrasound, 67 per cent had restored blood flow within 2 hours. This happened in only 33 per cent of those on a lower dose of tPA alone. "The oscillating bubbles enable the tPA to reach binding sites in the clot," says Alexandrov.

However, there are still serious safety concerns. Two of the 11 people on the highest tPA dosage who also received ultrasound suffered a haemorrhage and died (Annals of Neurology, DOI: 10.1002/ana.21723). In these cases, it was unclear what caused the bleeding, though it is possible that collapsing bubbles could have damaged blood vessels. Alexandrov will be launching a new trial next year.

Until these concerns are answered, bubbles could instead be useful in cases where destruction is the goal. "Turn the ultrasound energy intensity up and the bubbles oscillate much more violently, and could actually break down blood clots, tumours and kidney stones," says Stride.

According to the bubble community, multi-purpose microbubbles have the potential to transform medicine. "Bubbles can be extremely useful in medical applications," says Stride. Holland agrees: "It's a hot area of research."

http://www.bbc.co.uk/news/technology-11734909

Supercomputers 'will fit in a sugar cube', IBM says

A pioneering research effort could shrink the world's most powerful supercomputer processors to the size of a sugar cube, IBM scientists say.

By Jason Palmer Science and technology reporter, BBC News, Zurich

The approach will see many computer processors stacked on top of one another, cooling them with water flowing between each one. The aim is to reduce computers' energy use, rather than just to shrink them.

Some 2% of the world's total energy is consumed by building and running computer equipment.

Speaking at IBM's Zurich labs, Dr Bruno Michel said future computer costs would hinge on green credentials rather than speed. Dr Michel and his team have already built a prototype to demonstrate the water-cooling principle. Called Aquasar, it occupies a rack larger than a refrigerator.

IBM estimates that Aquasar is almost 50% more energy-efficient than the world's leading supercomputers.

"In the past, computers were dominated by hardware costs - 50 years ago you could hold one transistor and it cost a dollar, or a franc," Dr Michel told BBC News.

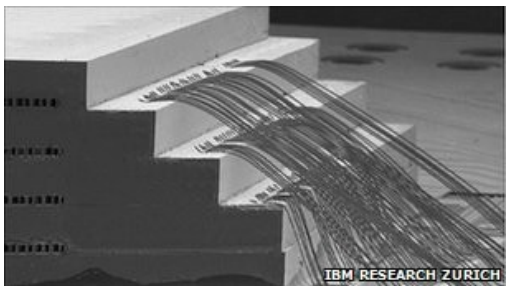
Now when the sums are done, he said, the cost of a transistor works out to 1/100th of the price of printing a single letter on a page. Now the cost of the building the next generation of supercomputers is not the problem, IBM says. The cost of running the machines is what concerns engineers.

"In the future, computers will be dominated by energy costs - to run a data centre will cost more than to build it," said Dr Michel. The overwhelming cause of those energy costs is in cooling, because computing power generates heat as a side product.

Cube route

"In the past, the Top 500 list (of fastest supercomputers worldwide) was the important one; computers were listed according to their performance. In the future, the 'Green 500' will be the important list, where computers are listed according to their efficiency."

Until recently, the supercomputer at the top of that list could do about 770 million computational operations at a cost of one watt of power.



Interlayer cool chip stack The prototype chip stacks are threaded with fine cooling layers **(Pic: IBM)**

The Aquasar prototype clocked up nearly half again as much, at 1.1 billion operations. Now the task is to shrink it. “We currently have built this Aquasar system that's one rack full of processors. We plan that 10 to 15 years from now, we can collapse such a system in to one sugar cube - we're going to have a supercomputer in a sugar cube."

Mark Stromberg, principal research analyst at Gartner, said that the approach was a promising one.

But he said that tackling the finer details of cooling - to remove heat from just the right parts of the chip stacks - would take significant effort.

Third dimension

It takes about 1,000 times more energy to move a data byte around than it does to do a computation with it once it arrives. What is more, the time taken to complete a computation is currently limited by how long it takes to do the moving. Air cooling can go some way to removing this heat, which is why many desktop computers have fans inside. But a given volume of water can hold 4,000 times more waste heat than air.

However, it adds a great deal of bulk. With current technology, a standard chip - comprising a milligram of transistors - needs 1kg of equipment to cool it, according to Dr Michel.

Part of the solution he and his colleagues propose - and that the large Aquasar rack demonstrates - is water cooling based on a slimmed-down, more efficient circulation of water that borrows ideas from the human body's branched circulatory system. However, the engineers are exploring the third dimension first.

They want to stack processors one on top of another, envisioning vast stacks, each separated by water cooling channels not much more than a hair's breadth in thickness.

Because distance between processors both slows down and heats up the computing process, moving chips closer together in this way tackles issues of speed, size, and running costs, all at once.

In an effort to prove the principle the team has built stacks four processors high. But Dr Michel concedes that much work is still to be done. The major technical challenge will be to engineer the connections between the different chips, which must work as conductors and be waterproof.

"Clearly the use of 3D processes will be a major advancement in semiconductor technology and will allow the industry to maintain its course," Gartner's Mark Stromberg told the BBC.

"But several challenges remain before this technology can be implemented - issues concerning thermal dissipation are among the most critical engineering challenges facing 3D semiconductor technology."

http://www.physorg.com/news/2010-11-bacillafilla-concrete.html

'BacillaFilla' for concrete cracks

A bacteria that can knit together cracks in concrete structures by producing a special 'glue' has been developed by a team of students at Newcastle University.

The genetically-modified microbe has been programmed to swim down fine cracks in the concrete. Once at the bottom it produces a mixture of calcium carbonate and a bacterial glue which combine with the filamentous bacterial cells to 'knit' the building back together.

Ultimately hardening to the same strength as the surrounding concrete, the 'BacillaFilla' – as it has been aptly named – has been developed to prolong the life of structures which are environmentally costly to build.

Designed as part of a major international science competition in the US, the students have scooped Gold for their research.

Joint project instructor Dr. Jennifer Hallinan explains: "Around five per cent of all man-made carbon dioxide emissions are from the production of concrete, making it a significant contributor to global warming.

"Finding a way of prolonging the lifespan of existing structures means we could reduce this environmental impact and work towards a more sustainable solution.

"This could be particularly useful in earthquake zones where hundreds of buildings have to be flattened because there is currently no easy way of repairing the cracks and making them structurally sound."

As part of the research, the students have not only considered the advantages of their engineered bacteria, but also the potential risks to the environment.

The BacillaFilla spores only start germinating when they make contact with concrete – triggered by the very specific pH of the material – and they have an in-built self-destruct gene which means they would be unable to survive in the environment.

Once the cells have germinated, they swarm down the fine cracks in the concrete and are able to sense when they reach the bottom because of the clumping of the bacteria.

This clumping activates concrete repair, with the cells differentiating into three types: cells which produce calcium carbonate crystals, cells which become filamentous acting as reinforcing fibres and cells which produce a Levans glue which acts as a binding agent and fills the gap.

The nine students, whose backgrounds range from computer science, civil engineering and bioinformatics to microbiology and biochemistry, took part in the International Genetically Engineered Machines contest (iGEM), is run out of the Massachusetts Institute of Technology (MIT) in Cambridge, Boston.

The aim is to get together a team of students from a variety of backgrounds to design and genetically engineer a bacterium to do something novel and useful.

Over 130 teams took part in this year's event and it is now the third time Newcastle University has won Gold. The team instructors were Professor Neil Wipat and Dr. Jennifer Hallinan, and the advisors were Dr. Wendy Smith, Dr. Matthew Pocock, Dr. Colin Davies, Dr. Jem Stach and Professor Colin Harwood.

Professor Neil Wipat added: "The students have done extremely well – this is a great achievement. Their work will now be used as a basis for research which is being carried out here at the University."

Provided by Newcastle University

http://www.physorg.com/news/2010-11-tolerating-foreign-materials-food.html

Tolerating foreign materials in food

An international team of molecular biologists led by RIKEN researchers (Japan) has unraveled key details of the molecular mechanism whereby the body's immune system determines what to attack among the organisms and food taken into the mouth, and what to leave alone or tolerate

An international team of molecular biologists led by RIKEN researchers (Japan) has unraveled key details of the molecular mechanism whereby the body's immune system determines what to attack among the organisms and food taken into the mouth, and what to leave alone or tolerate. The researchers have shown the pivotal role of two proteins found on the surface of cells that stimulate the immune system into action, the dendritic antigen-presenting cells (APCs). The work may lead to new therapies for immune disorders, and to ways of boosting the effectiveness of oral vaccines.

Animals could not survive without the nutrients and beneficial micro-organisms they ingest when feeding. But the foreign material taken in through the mouth and passing through the gut also contains harmful substances and organisms. So the immune system must balance active protection against pathogens and toxins with a non-responsiveness to food and commensal bacteria known as oral tolerance. In the past, researchers have proposed two mechanisms for oral tolerance—reducing the numbers of effector T cells, the immune-system foot soldiers that move against foreign material and suppress their action by means of specialized regulatory T cells.

The triggering of effector T cells depends on interaction with two distinct types of proteins on the surface of the APCs, antigens that are markers of foreign material and co-stimulatory proteins of the B7 family, which regulate the response. Both must be present, however, to initiate any action.

Using mice deficient in B7 co-stimulatory proteins Katsuaki Sato and colleagues from the RIKEN Research Center for Allergy and Immunology in Yokohama, together with researchers from other laboratories in Japan, and in the US and France, found that oral tolerance demanded the presence of B7-H1 and B7-DC proteins1. In fact, without these proteins the immune response was enhanced. Of the APCs, the dendritic cells of the mesenteric lymph nodes, in the membranes surrounding the digestive system, display higher levels of these proteins.

When the researchers investigated the role of the two B7 proteins, again using B7-deficient mice, they discovered the proteins induced the generation of regulatory T cells rather than normal effector cells. These regulatory T cells then damp down the immune response promoting tolerance. During inflammation, however, their action is swamped.

The research group wants to continue analyzing the role of different groups of dendritic cells in live mice, Sato says. “In particular, we wish to identify the molecular basis of the regulation of the function of these cells.”

More information: *Fukaya, T., et al. Crucial roles of B7-H1 and B7-DC expressed on mesenteric lymph node dendritic cells in the generation of antigen-specific CD4+Foxp3+ regulatory T cells in the establishment of oral tolerance. Blood 116, 2266–2276 (2010). Article Provided by RIKEN*

http://www.physorg.com/news/2010-11-liquorice-root-brain-cells.html

Liquorice root may protect brain cells

A neuroscientist at the University of South Carolina is conducting research on a compound found in liquorice root that could prevent or slow down the cell death associated with neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases.

Dr. Rosemarie Booze, the Bicentennial Chair Professor in Behaviorial Neuroscience in the university’s College of Arts and Sciences, is isolating liquiritigenin -- or LQ, as Booze calls it -- and is testing its neural effects.

LQ is a phytoestrogen, a compound that is found naturally in plants and that mimics the hormone estrogen. Phytoestrogens bind to one of two types of estrogen receptors (ER) -- alpha and beta -- found in cells in the human body, said Booze. Ones that target alpha ERs, which are found throughout the body, have demonstrated qualities that may prevent some cancers, including breast, ovary and uterus. Beta ERs, which LQ targets, are found in cells in the brain.

“Plants are amazing chemists!” Booze said. “Phytoestrogens are only made by plants, and there are several different ones that target estrogen receptors. We are focusing on the beta compounds for neural effects, and these can be found in liquorice root, soybeans and other plants.”

Booze’s research is funded by a $1.8 million grant from the National Institutes of Health (NIH).

“Alpha and beta estrogen receptors are very close in structure, but beta estrogen receptors are more localized in the brain and have different effects on brain cells,” Booze said. “We know that LQ is the active compound in one traditional Chinese medicine and is used to treat post menopausal women. We’re looking at it for its brain effects.” Booze said creating synthetic forms of these naturally occurring compounds in plants is difficult to do in a lab. “They are potent compounds as natural plants,” Booze said.

Alzheimer’s, Parkinson’s and HIV-related dementia are neurodegenerative diseases because they involve the loss of neurons, or brain cells, over time.

“We’re testing the ability of plant-derived phytoestrogens, such as genistein and LQ, to help nerve cells survive in neurodegenerative diseases and keep neurons connected and functional,” she said. “We want to maintain that brain plasticity.”

Booze’s research is the first ever done on LQ and the first to test some of these phytoestrogens in the brain. She and a USC research team are testing the ability of these compounds to help nerve cells survive, and even make new connections, in laboratory petri dishes. This allows them to see which parts of the compound are critical for nerve-cell survival and how these phytoestrogens are different from the actual hormone estrogen.

“LQ absorbs well in the intestines, and it crosses the blood-brain barrier very well,” said Booze. “LQ may be novel in Western cultures, but it has been used in Eastern cultures for a long time.”

Working with Booze on the LQ research are fellow USC neuroscientists Dr. Charles Mactutus, Dr. Michael Aksenov, Dr. Jun Zhu; current graduate students Landhing Moran, Lauren Hord and Sarah Bertrand; and several undergraduates, including Tor Espensen-Sturges, who is testing the LQ as part of her honors thesis.

Booze has been conducting research on the relationship between chemical compounds and the brain for more than 20 years. During that time, her research has received continuous funding from the NIH, totaling more than $17 million to date. A recent NIH grant renewal will extend her funding through 2015.

LQ isn't Booze's first foray into phytoestrogen research. She did similar work in isolating estrogen receptor compounds in soybeans. The alpha ER compounds found in soy have shown to help protect against female cancers. Soy is found in cosmetics, as well as in cereals, breads and legumes.

"Instead of putting it on your face, we're looking to put LQ in the brain," Booze said.

For her phytoestrogen research, including LQ, Booze works with the Kentucky-based company, Naprogenix, which specializes in the isolating of estrogen receptive compounds in plants such as soybean, bulrush and plantains. She hopes to receive an additional NIH grant that would enable the university to collaborate with Naprogenix and test the phytoestrogen compounds that the company isolates.

"I hope that the compound like LQ, or these other new estrogen receptor beta-targeted compounds, would both prevent and slow neurodegeneration in these devastating diseases," Booze said. "My father has severe Parkinson's, so I understand what families go through and how desperate the need is for any neuroprotective therapeutic, and this work with phytoestrogens opens up a whole new era of research for neuroscientists."

Provided by University of South Carolina

http://www.physorg.com/news/2010-11-myocarditis-hearts.html

Myocarditis can attack hearts without warning

While not always life-threatening, in many cases it can lead to heart failure or sudden cardiac death. Physicians believe it is caused by either a viral, bacterial, or fungal infection; drug or chemical poisoning; or connective tissue diseases, such as lupus or rheumatoid arthritis.

James "Jimmy" Armstrong hadn't missed a "Mac" in 28 years. At 44, he's one of the youngest "goats" in the Chicago Yacht Club. Sailors receive the designation of "goat" once they've completed 20 or more "Macs", the 333-mile boat race from Chicago to Mackinac, Mich. Armstrong has sailed the race every year since he was 16. But, he wasn't among the sailors this past July. Instead, he was in intensive care awaiting heart transplant following a harrowing experience spurred by severe case of myocarditis—a little-known condition causing inflammation of the heart muscle.

"I don't remember much of what happened to me. A lot of it is a blur," said Armstrong, a local business owner and father of three young daughters. "I was thinking I had a bad cold or even food poisoning, and then suddenly my health spiraled out of control."

Armstrong had no prior history of heart problems. However, persistent bouts of dizziness and nausea sent him into the emergency room of his suburban hospital June 6. Cardiac imaging confirmed Armstrong had acute myocarditis. While not always life-threatening, in many cases it can lead to heart failure or sudden cardiac death. Physicians believe it is caused by either a viral, bacterial, or fungal infection; drug or chemical poisoning; or connective tissue diseases, such as lupus or rheumatoid arthritis.

According to Northwestern Medicine Cardiologist William Cotts, MD, patients can often have fever, aches and severe fatigue similar to cold or flu-like symptoms. This can sometimes correct with no lasting damage. But in severe cases like Armstrong's there's often the presence of an irregular heartbeat and trouble breathing—and symptoms usually present once the patient is already in heart failure.

This was the case with Armstrong. When he was referred to Northwestern Medicine's cardiac specialists at the Bluhm Cardiovascular Institute, the myocarditis had so aggressively deteriorated his heart function that full support—in effect an artificial-heart-like device—was his only hope.

Edwin C. McGee, Jr. MD, surgical director for the Bluhm Institute's heart transplant and assist device program was Armstrong's cardiac surgeon. Although Armstrong ultimately required heart transplant, in July he received life-saving intervention where two HeartWare® ventricular assist devices (VAD) were implanted onto both ventricles of his heart as a "bridge to transplant", sustaining heart function until a heart became available. This was the first time anywhere in North America—and to date the only—instance of using the small VADs in a biventricular configuration—two VADs instead of one—implanted on a single heart. This particular device is one of the smallest, full-support experimental VADs currently available for study in humans in the U.S.

This past Oct. 15, Armstrong received a heart transplant. The American Heart Association estimates that an average of 300,000 people die every year from heart failure; 10,000 of them qualify for heart transplant, but only 2000 cardiac transplants occur in the US each year due to lack of organs. Assist devices such as what Armstrong received are becoming an increasingly important therapy to help individuals with advanced heart failure.

"I may never know why or how I contracted the myocarditis that destroyed my heart," Armstrong said. "But I know I wouldn't be here if Northwestern's team hadn't acted as fast as they did to save my life."

Provided by Northwestern Memorial Hospital

http://www.bbc.co.uk/news/health-11749078

'One in four cancers' detected at emergency stage

Nearly one in four cancer patients in England is diagnosed only when they arrive at hospital in an emergency, a national study suggests.

The National Cancer Intelligence Network (NCIN), which looked at data from diagnoses in 2007, found 23% of cases had been detected at that stage. In the cases of acute leukaemia and brain cancer, half of cases were only discovered at a critical stage. Cancer Research UK said more education was needed to recognise symptoms.

The NCIN report suggested those who were diagnosed only at the emergency stage were more likely to die within a year than those diagnosed earlier.

Harpal Kumar, the chief executive of Cancer Research UK, told the Daily Telegraph: "The figure for diagnoses via emergency presentations is way too high.

"This statistic helps explain why we have lower survival rates than we would hope to have, lower than the best countries in Europe. We need screening programmes to be rolled out as early as possible and GPs given rapid access to the tests that will enable patients to be moved quickly through the system."

The survey suggested those on low incomes, elderly people and the under-25s were the most likely to be diagnosed at a late stage.

Only 3% of skin cancers went undetected until the emergency stage, compared with 58% of brain cancers.

Sara Hiom, director of health information at Cancer Research UK, said the late diagnosis levels were "alarmingly high". She said: "We hope the government will seriously consider the best way to tackle this problem in their revised cancer strategy, which is due in the coming months."

A spokesman for the Department of Health said: "We are committed to improving cancer outcomes. Earlier diagnosis is crucial to match the best survival rates in Europe."

Last December, government cancer tsar Professor Mike Richards said the NHS in England needed to get better at diagnosing cancers at an earlier stage if it was to continue to improve survival rates.
He called for a greater focus on one-year survival rates, an indication that cancer was spotted at a treatable stage.

http://www.eurekalert.org/pub_releases/2010-11/jhmi-ssp111110.php

Study suggests physicians wait longer for brain recovery after hypothermia Rx in cardiac arrest

Heart experts at Johns Hopkins say that physicians might be drawing conclusions too soon about irreversible brain damage in patients surviving cardiac arrest whose bodies were for a day initially chilled into a calming coma.

The chilling, known as therapeutic hypothermia, is one of the few medical practices known to improve brain recovery after sudden heart stoppages, with brain recovery usually assessed three days after the incident. The therapy, recommended in American Heart Association treatment guidelines since 2005, is thought to work by slowing down the body's metabolism, delaying the brain's need for oxygen until the heart, lungs and kidneys can recover.

Senior study investigator and cardiologist Nisha Chandra-Strobos, M.D., says large, multicenter studies will be required before experts can definitively suggest changes to current standards of care. However, early indications are that "we may need to be much more deliberate in allowing the brain to recover before adjudicating on the neurological benefits of therapeutic hypothermia, as there is obviously more variability in patient response to treatment than previously thought.

"It is definitely a clinical situation about which we have much more to learn in order to maximize care for our cardiac arrest patients," says Chandra-Strobos, a professor at the Johns Hopkins University School of Medicine and its Heart and Vascular Institute, where she also serves as director of cardiology at Johns Hopkins Bayview Medical Center.

Reporting on a study of 47 men and women treated for cardiac arrest at Johns Hopkins Bayview, lead study investigator and internist Shaker Eid, M.D., says their results "show that people who have been immediately treated with hypothermia are more likely to wake up and are taking longer to wake up, as opposed to those who do not receive such treatment. "Hypothermia patients are showing initial signs of renewed brain activity five and sometimes even seven days after suffering cardiac arrest," says Eid, who is scheduled to present the team's findings Nov. 13 at the American Heart Association's (AHA) annual Scientific Sessions in Chicago.

"Physicians and family members may need to wait longer than the traditional three days before making irrevocable decisions about brain function recovery and possible withdrawal of care," says Eid, an assistant professor at Johns Hopkins. The Johns Hopkins study is believed to be the first timeline analysis of neurological recovery after hypothermia treatment in victims of cardiac arrest.

"An obvious concern in light of these results is that we may be withdrawing support prematurely in selected patients," says Chandra-Strobos. "The concern is valid; however, our clinical and study experience are reassuring since most patients are observed and treated more than seven days." The average length of stay at Johns Hopkins Bayview for such patients is 13 days, which she says is more than adequate to allow for neurological recovery.

The chilling and coma therapy itself typically lasts less than 24 hours, and patients are slowly weaned off powerful sedatives and simultaneously warmed up to a normal body temperature of 37 degrees Celsius. Experts say that if an ambulance reaches an arrest victim shortly after they have collapsed, the patient can be chilled in the hospital emergency room or in the intensive care unit within a few hours to the desired temperature -- 33 degrees Celsius -- using a combination of cold intravenous solutions and "ice blankets," suits, vests or helmets.

Not all victims of cardiac arrest, they caution, are candidates for therapeutic hypothermia. According to Eid, the treatment works best when emergency personnel are by the side of the patient at the time of actual collapse and can start immediate CPR and restart the heart, usually with a combination of drugs and sometimes electrical shock from a defibrillator. The treatment is also more effective, he says, in such people if their initial collapse was brought on by an electrical disturbance in the heart, what is known as a ventricular fibrillation rhythm. More than 300,000 cardiac arrests occur outside of hospitals each year in the United States, with less than 8 percent of victims surviving their medical crisis with brain function intact, a statistic Chandra-Strobos calls "pitiful."

In the new study, the Johns Hopkins researchers monitored the 47 men and women treated with and without therapeutic hypothermia. More than half died in the hospital. However, survival rates were higher for those whose bodies were chilled than for those who were not. In seven survivors treated with hypothermia, more than half remained comatose three days after sedation was withdrawn, with only a third showing signs of renewed brain activity. By the fifth day, the numbers were reversed, with more than half showing signs of waking up and only a third remaining comatose. And after a week, one-third were fully alert and awake, while half showed signs of brain function returning.

This contrasts, the researchers say, with the 13 other survivors who were not candidates for therapeutic hypothermia. Almost half were immediately alert upon resuscitation, while the majority, 80 percent showed signs of brain awakening by day three, as commonly expected.

Experts say current neurologic evaluation guidelines, in place since 1985, state that by day three, decisions can be made about whether or not to withdraw care in the absence of renewed brain activity.

Funding for this study was provided by Johns Hopkins Bayview Medical Center.

In addition to Eid and Chandra-Strobos, other Hopkins researchers involved in this study were Skon Nazarian, B.Sc.; Devon Dobrosielski, Ph.D.; Scott Carey, B.Sc.; Joel Palachuvattil, M.Sc.; Romergryko Geocadin, M.D., Ph.D.; Rafael Llinas, M.D.; and Kerry Steward, Ed.D.

(Presentation title: A Paradigm Redefined, Time Course of Neurological Recovery Following Hypothermia Therapy Post Non-Traumatic Out-of-Hospital Cardiac Arrest.)

http://www.newscientist.com/article/mg20827864.900-red-light-forces-cancer-cells-to-suck-up-drugs.html

Red light forces cancer cells to suck up drugs

CELLS absorb chemotherapy drugs more readily if they are zapped with red light. The finding could help produce more effective cancer treatments.

Most cancer chemotherapy relies on cells absorbing drugs by diffusion across the cell membrane. This does not always work, because some cells simply push the drug molecules back out using a natural pump mechanism.

To overcome this problem, Andrei Sommer at the University of Ulm in Germany and colleagues exposed cells to pulsed red laser light. Light of this wavelength decreases water density and pushes water out of the cell. When the laser is switched off, the water returns to its high-density state, forcing the cell to "suck in" water and any other molecules, including drugs, from its surroundings.

The researchers tested their technique by applying the light for 1 minute to human cervical cancer cells surrounded with common anti-cancer drugs such as epigallocatechin gallate (EGCG). This short period of light exposure was sufficient to kill off 70 per cent of cancer cells surrounded by EGCG, compared with 31 per cent of cells not exposed to light (Journal of Controlled Release, DOI: 10.1016/j.jconrel.2010.10.010).