

Breathing trouble may be fatal during epileptic seizures

Study shows dropping blood oxygen levels in patients having mild seizures

By ELAINE HSIA
Aggie Science Writer

A new study by UCD researchers suggests that some epilepsy related deaths result from patients' brains not telling their bodies to breathe during seizures.

The finding could help identify a risk factor for Sudden Unexpected Death in Epilepsy, a condition in which the reason for death is unknown and is not due to prolonged convulsive seizures or seizure-related accidents.

Seizures cannot be controlled with medication for nearly one-third of epilepsy patients, according to the Citizens United for Research in Epilepsy organization. Having poorly controlled epilepsy appears to be the biggest risk factor for SUDEP although the underlying causes are not well understood.

Epilepsy patients who suffer generalized seizures that stem from the whole brain do not breathe during seizures and their blood oxygen levels are expected to drop, said lead study author Lisa Bateman, an assistant professor of neurology at UC Davis Medical Center.

"The somewhat surprising thing is that people who are having ... more minor seizures ... where the patient could just be sitting very quietly, maybe have a bit of lip smacking or a slight head turn or a bit of fumbling with their hands, would actually have such profound changes in their respiratory function as well," she said.

Patients whose seizures begin in a specific part of the brain are candidates for surgery to control their seizures. To determine the origin of seizures, patients must be weaned off anti-epileptic medication and seizures allowed to take place under hospital supervision. Researchers monitored 56 such patients to record what happened to their brain activity, breathing, heart rate and blood oxygen levels during seizures.

A total of 304 seizures in the patients were analyzed, one third of which were accompanied by dips in blood oxygen levels to below 90 percent of normal for nearly two minutes. Notably, in 12 percent of minor cases that did not progress to generalized seizures, oxygen levels dipped below 70 percent of normal. In some patients, breathing was impaired or stopped altogether. None of the patients experienced dips in heart rate, leading the researchers to exclude cardiac problems as a cause for the drop in oxygen.

Lower dips in oxygen were often associated with longer seizures that began in the temporal lobe and then spread to other areas of the brain. The researchers posit that seizure activity in these areas may disrupt brain signaling pathways that control normal breathing.

The transient oxygen level dips may not be immediately life threatening, but the overall implication for them happening repetitively with seizures in the long run is not known, Bateman said.

In some patients, this was accompanied by a rise in blood carbon dioxide levels, which remained elevated even after their seizures ended. At a certain point, high carbon dioxide levels can cause the heart to stop functioning properly.

"Seeing that there are groups of patients whose seizures appear to have a significant impact on their respiratory function could indicate that they are at higher risk [for SUDEP] and they need to be monitored closely and intervened appropriately," Bateman said.

Whether impaired breathing during seizures is actually a risk factor for SUDEP will require larger studies of epilepsy patients, as well as follow up studies on patients who were already monitored, she added.

"It is difficult to recommend routine oxygen monitoring in all patients with epilepsy in the hospital," said Maromi Nei, an associate professor of neurology at Thomas Jefferson University. "However, [this study] certainly suggests that patients with epilepsy ... at higher risk for seizures due to planned controlled anti-epileptic medication withdrawal should be carefully monitored, particularly for any respiratory difficulties associated with seizures."

Besides vigilant oxygen monitoring, interventions include oxygen administration and drugs that will potentially ameliorate respiratory arrest.

ELAINE HSIA can be reached at campus@theaggie.org.

DNA of UCD

Physics professor delves into dark matter

By LAUREN STEUSSY
Aggie Staff Writer

Have you ever looked up into the sky and wondered to yourself, "What's out there?" The mysteries of space can be the most puzzling, yet exciting phenomena of science today. To Andreas Albrecht, this phenomena is simply enthralling. Albrecht is a professor of physics at UC Davis and studies dark matter, dark energy, cosmic inflation and — when he's not wrapping his mind around the universe — the delicate art of Pretty Pretty Princess.



Andreas Albrecht professor

here at UC Davis.

Dark energy matters because it is likely to completely change our fundamental understanding of physics. Observations tell us it comprises around 70 percent of the universe, yet we have absolutely no idea what the dark energy is.

When did you know you wanted to be a physicist and cosmologist?

I was inspired by my high school physics class, and also by conversations with my dad — who was a physical chemist — to aspire to be a

physicist. But for a long time I was wary of cosmology, which had a reputation for asking big questions but not coming up with many answers. My thesis adviser, Paul Steinhardt, persuaded me that times were changing. And indeed, thanks to many remarkable advances over the last three decades many regard the current era as a "golden age of cosmology."

What is the most radical theory of the universe you've ever heard?

There are a huge number of radical ideas out there. A common thread among many of them is that what we observe is just an impossibly tiny fraction of the entire universe. The rest may include regions that look very different from the universe we know, perhaps even with different laws of physics. This is radical because our research keeps pulling us in that direction, even though most physicists like to think of ourselves as very practical people who only work on things we can see and test in labs or observatories. Remarkably, there may even be ways we can test some of these radical theories of the universe.

What's your favorite planet and why?

Earth. What an amazing place to live!

Do you believe there is life on other planets?

Absolutely.

Who is the most interesting scientist you've ever met?

It's really tough to choose only one. A great choice though is John Wheeler. He is famous for many fundamental contributions to nuclear physics, particle physics and general relativity (and he invented the name "black hole"). But along with his many very practical contributions, he also was an incredibly adventurous thinker and could surprise all colleagues with totally wild-sounding ideas — many of which did not sound quite so wild if you caught a glimpse of how he got there. Wheeler was also a superb teacher. He loved teaching undergraduates at all levels, and many of his Ph.D. students became great scientists (including the Nobel Prize winner Richard Feynman).

What scientific phenomenon most boggles your mind the most?

That science works at all: Everyday life seems pretty chaotic, yet underneath it all we've uncovered simple fundamental laws of nature that have been successfully tested from the tiniest subatomic scales to beyond the most distant galaxies.

What is something your students may not know about you?

My wife — the musician — will say that my first career idea was to be a concert violinist. My kids will say that I play a wicked game of Pretty Pretty Princess and that I love the movie Zoolander.

LAUREN STEUSSY can be reached at features@theaggie.org.

Upcoming seminars

Today

Environmental Drivers of Large-Scale Spatial and Temporal Patterns in Mosquito Abundance and Virus Transmission in California

Chris Barker, UC Davis
12:10 to 1 p.m., 122 Briggs
Sponsored by entomology

Monday, Dec. 1

The Impact of Human Lysozyme Transgenic Milk on Health and Response to Immune Challenge in Young Pigs

Dottie Brundige, UC Davis
12:10 p.m. to 1 p.m., Weir Room, 2154 Meyer
Sponsored by animal science

AvrXA21 Activity in the Rice Bacterial Blight Pathogen, Xanthomonas oryzae pv. oryzae, Requires a Tyrosine Sifotransferase

Sang-Wook Han, UC Davis
1:10 to 2 p.m., 115 Hutchison
Sponsored by plant pathology

Tuesday, Dec. 2

Managing Chronic Illness

Beth Cohen, UC Davis
Noon to 1 p.m., 126 Voorhies
Sponsored by Academic and Staff Assistance Program

More seminars can be found at calendar.ucdavis.edu. If you'd like to publish a seminar here, send an e-mail to features@theaggie.org.

SCIENCE SCENE

Western pine forests succumb to North America's largest known insect invasion

Western pine forests are experiencing an infestation of bark beetles that is destroying millions of acres of trees in the area.

Experts say it is the largest known species infestation that has ever occurred in North America.

The problem is the worst in British Columbia and Alberta. About 33 million acres of lodgepole pine forest have been destroyed in British Columbia, and winds in 2006 blew the beetle into northern Alberta. Experts fear the insects could travel as far as the Great Lakes.

The situation is also particularly bad in Colorado, where experts predict that practically all lodgepole pines over 5 inches in diameter will be lost if the trend continues.

One speculation for the outbreak include fire suppression, making almost all forests nearly the same age and letting trees grow large enough to be susceptible to beetles. Other contributors include a decade of drought that has weakened trees as well as milder winters.

The beetle invasion is causing an array of problems. It is negatively affecting the tourism industry and shifting the region's ecosystems.

In hopes of keeping forests from dying completely, landowners are cutting down the pines. Cutting enough (about 75 percent) of the pines may reduce completion

for water and allow for some trees to remain alive.

(Source: nytimes.com)

Unhappy people spend more time watching television

Unhappy people watch 30 percent more TV than those who describe themselves as content, according to a new study by researchers at the University of Maryland.

In the study, one of the first to compare leisure activity with personal contentment perception, it was found that those who describe themselves as "not too happy" watch about 5.6 additional hours of television compared with those who say they are really happy.

The research involved public opinion data from over 40,000 participants and time-use diaries.

The authors of the study say this does not mean that television watching causes unhappiness, but that there is a link that is not yet understood.

The study's authors say that people may watch TV to ward off unhappiness. The happiest people estimate their weekly TV watching to 18.9 hours a week, while the least people estimated nearly 25 hours a week, according to the study.

(Source: washingtonpost.com)

ANNA OPALKA compiled SCIENCE SCENE and can be reached at features@theaggie.org.

Wisconsin stem cell outfits to merge

By KEVIN BARGNES
Badger Herald (U. Wisconsin)

One of the state's largest stem cell research companies, founded in part by stem cell pioneer James Thomson, announced a merger with two other Madison-based corporations, finalizing \$18 million in funding.

Cellular Dynamics International will merge with its partner companies Stem Cell Products Inc. and iPS Cells Inc.

University of Wisconsin cardiology professor Tim Kamp, a co-founder of CDI, said the newly formed 50-employee company will be more streamlined under one name.

"It'll make things more efficient to allow the company to be a little bigger, so we'll have more people working together on these problems," Kamp said. "Obviously we were already related in our interest in stem cells, so it

just allows things to be more efficient."

The \$18 million, originally announced last month, was funded in part by the Wisconsin Alumni Research Foundation.

"That's being used to help set up our infrastructure as we plan to grow," said CDI spokesperson Joleen Rau.

Other contributors included two Wisconsin-based venture capital firms.

In a statement Monday, CDI Chief Financial Officer David Snyder said the funding from these companies was "remarkable" given the current economic crisis, and is a prime example of the support the stem cell industry receives from the state.

"We believe that if Wisconsin can continue to attract investment in stem cell commercial infrastructure, we have the opportunity to be the major hub of the emerging stem cell industry," Snyder said.

CDI was founded in 2004 by Thomson, a UW anatomy professor, Kamp, UW cardiology professor Craig January and UW assistant professor of anatomic pathology Igor Slukvin.

The company develops stem cell technologies and also works to personalize the field to individual patients.

Kamp said CDI is currently working with induced pluripotent stem cells, or iPS cells, which were developed in Thomson's lab in 2007.

Preliminary research shows these man-made cells can behave just like embryonic stem cells.

Kamp said the new CDI company will develop them and makes them readily accessible to pharmaceutical companies.

"iPS cells are so new — it's only been a year now — so we've just gradually been putting more and more efforts toward them," Kamp said. "They are becoming an

increasing focus, but not an exclusive focus."

Gov. Jim Doyle, a staunch supporter of stem cell research, said in a statement Monday he sees the merger as "great news for the entire state of Wisconsin" since it will improve a field that can lead to job growth.

"Despite our national economic downturn, I am pleased that our business leaders are continuing to invest in innovative companies like Cellular Dynamics which will provide the high-end jobs of the future," Doyle said.

Madison has become a mecca for stem cell research and development. Thomson first isolated human embryonic stem cells at UW in 1998 before developing iPS cells last year.

The city is also home to two large stem cell banks: WiCell, which opened in August, and the National Stem Cell Bank, which opened in 2005.

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